DIP HOPPING VS. COOLPOOLING

UNITANK ROUNDUP

BRITISH BEAUTY: STRONG BITTER

BrewYour Own

THE HOW-TO HOMEBREW BEER MAGAZINE

SEPTEMBER-OCTOBER 2025, VOL. 31, NO. 5

WWW.BYO.COM

CZECH IT OUT!

MASTER CLASSIC CZECH BEER STYLES — FROM BREWING TO SERVING

EVALUATING YOUR MALT

MASTER DARK SPECIALTY GRAINS

A BELGIAN BEER ADVENTURE

BYO 30 YEARS

FEBRUARY 6, 2026
11 A.M. TO 6 P.M. EASTERN

12 Advanced Brewing Topics • 12 BYO Brewing Experts

Don't miss a full day with 12 hours of live, online, advanced homebrewing seminars led by Brew Your Own Magazine's expert writers. Each class will also be recorded and you'll have full access to video replays and course materials in addition to the live broadcast. Learn new advanced techniques & get your brewing questions answered live by experts!

- ADVANCED WATER ADJUSTMENTS
- PRESSURE FERMENTATION
- YEAST BANKING & SLANTS
- ADVANCED IPA TECHNIQUES
- BREWING WITH ALTERNATE GRAINS
- ADVANCED HOME DRAFT TECHNIQUES
- ADVANCED DRY HOPPING
- QC BEER TESTS AT HOME
- ADVANCED LAGER TECHNIQUES
- DIP HOPPING
- ADVANCED SOUR BEER TECHNIQUES
- ALL-GRAIN TRICKS & HACKS

REGISTER NOW
ONLY $99

- 12 Hours of Live Advanced Classes Taught by Experts
- Access to Video Replays of all 12 Seminars with Course Materials
- Get Questions Answered Live & Learn New Skills

BYO.COM/PRODUCT/BYO-U-ADVANCED

contents

SEPTEMBER-OCTOBER 2025, VOL. 31 NO. 5

features

BYO 30 YEARS

BrewBuilt® X3 UNI

Ultimate Jacketed Conical

- Professional 8" Tri-Clamp Lid
- Floating Dip Tube With Keg QDs
- Full Cooling Jacket
- Neoprene Insulation Sleeve
- 3" Butterfly Bottom Valve
- 15 psi Pressure Capable
- Mirror Polish Finish
- Internally Welded & Polished Ports
- Wide Base With 4 Legs For Stability
- Flex Chamber For Trub Collection

ON SALE

USE CODE **X3BYO**

7 Gallon X3
$150 Off
CON800A

14 Gallon X3
$200 Off
CON801A

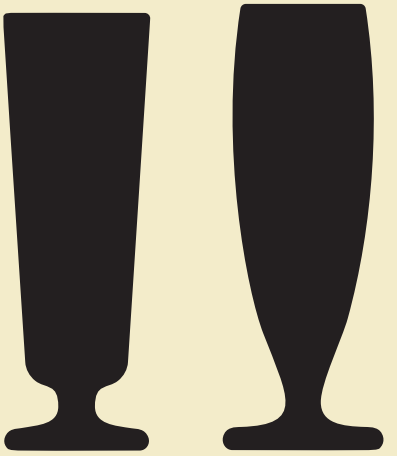
Brew Your Own
THE HOW-TO HOMEBREW BEER MAGAZINE

departments

Photo courtesy of Shutterstock.com

where to find it

RECIPE INDEX



RECIPE STANDARDIZATION

EXTRACT EFFICIENCY: 65%
(i.e. — 1 pound of 2-row malt, which has a potential extract value of 1.037 in one U.S. gallon of water, would yield a wort of 1.024.)

EXTRACT VALUES FOR MALT EXTRACT:
liquid malt extract (LME) = 1.033–1.037
dried malt extract (DME) = 1.045

POTENTIAL EXTRACT FOR GRAINS:
2-row base malts = 1.037–1.038
wheat malt = 1.037
6-row base malts = 1.035
Munich malt = 1.035
Vienna malt = 1.035
crystal malts = 1.033–1.035
chocolate malts = 1.034
dark roasted grains = 1.024–1.026
flaked maize and rice = 1.037–1.038

HOPS:
We calculate IBUs based on 25% hop utilization for a one-hour boil of hop pellets at specific gravities less than 1.050. For post-boil hop stands, we calculate IBUs based on 10% hop utilization for 30-minute hop stands at specific gravities less than 1.050. Increase hop dosage 10% if using whole leaf hops.

Gallons:
We use U.S. gallons whenever gallons are mentioned.

Brew Your Own
THE HOW-TO HOMEBREW BEER MAGAZINE

EDITORIAL & ADVERTISING OFFICE
Brew Your Own
5515 Main Street
Manchester Center, VT 05255
Tel: (802) 362-3981 Fax: (802) 362-2377
Email: BYO@byo.com

MEMBERSHIPS
Brew Your Own
5515 Main Street
Manchester Center, VT 05255
Tel: (802) 362-3981
M-F 8:30-5:00 EST
E-mail: byo@byo.com
$39.99/year

Cover Photo Illustration:
Shutterstock.com

What style do you brew because it's not easy to get?

Dark mild. I didn't know how much I loved this style until being inspired by this story we did on it in 2022. Since then I've brewed at least two a year. It's light enough that it works on hot days in the summer, at about 4% ABV it makes for a great afternoon beer, and because it's got a ton of flavor (I often add a bit of chocolate malt, which may not be totally traditional) it also fits great in the cooler seasons.

Australian Sparkling Ale (ASA)! I started brewing this style around 2016–2017 when it was first added to the BJCP guidelines. It has a rich history, which I came to appreciate after connecting with Australian beer historian Peter Symons and collaborating on a recipe with him. It checks all the boxes for me: Light, crisp, highly carbonated, with a touch of malt character, plenty of hop and yeast aroma, and low ABV.

Saison, and it's not even close. If you're lucky you may find a fresh saison locally, but the classic saisons typically available are pasteurized and have traveled a few months in a hot shipping container. I enjoy malt and hops but have always been enthralled with the magic of yeast. Saison is nothing if not a showcase of peppery yeast spice.

BrewYourOwn
@BrewYourOwn
@brewyourownmag
@brewyourownmag

suggested pairings at BYO.COM

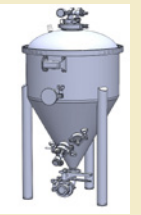
The Bitter Truth

British bitter is broken into three distinct styles in the Beer Judge Certification Program style guide, largely based on strength. However, there are other variations of bitter that don't fit any of these categories. Get to better know the Yorkshire and Manchester bitters and then give brewing one — or both — a try. www.byo.com/article/the-bitter-truth

The Lighter Side of Specialty Malts

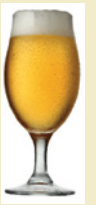
Specialty malts provide many key aspects to your beer such as flavor, aroma, color, body, mouthfeel, sweetness, acidity, and head retention. Take a closer look at the specialty malts available to homebrewers that fall below 30 Lovibond. www.byo.com/article/the-lighter-side-of-specialty-malt

Carbonating in a Unitank: "Mr. Wizard"



One of the largest benefits of unitanks is the ability to hold pressure for carbonating in the tank. It saves time and money, but there are some tricks to do it more successfully, which Ashton Lewis answers in this "Mr. Wizard" column: www.byo.com/mr-wizard/carbonating-in-a-unitank

You Dip, I Dip, We Dip West Coast Pilsner Recipe



Dip hopping and other late-hopping techniques aren't just for IPAs. This West Coast Pilsner recipe is meant to showcase the twin powers of the all-around craft hop – Citra® – and the power of dip hopping. This is a crisp, quick Pilsner with a zippy hop presence that leans into the more tropical citrus and pineapple notes of Citra®. www.byo.com/recipe/you-dip-i-dip-we-dip-west-coast-pilsner

MAIL

IS THERE ALCOHOL IN HOP WATER?

I am inquiring about the ingredients in hop water after reading that yeast is sometimes added. I've been doing some research and I'm just trying to make sense of the process as it relates to yeast and hops. I just want to make sure that even if there is yeast involved, that does not mean there are any small trace amounts of alcohol, is that correct?

Tyler Yeatts • *via email*

It is safer to say that there is no "significant amount" of alcohol in hop waters that use yeast for its biotransformative benefits, instead of saying "no trace amounts." While no sugar (or significant source of sugar, such as grain in beer) is added when making hop water, hops actually have a tiny amount of sugar that may ferment when adding yeast. If you were to add lemon juice for acidity, or any other fruit of course, that would also add sugar. Check out this story Vito Delucchi wrote for BYO *a couple years back on hop water that explains this in more detail: www.byo.com/article/hop-water. Here is the most pertinent info from that story related to what you're asking:*

"Worth mentioning, hops do in fact have small amounts of sugar in them. I won't go deep into this, but if you're interested in learning more, I'd recommend The New IPA *by Scott Janish, which goes deeper into the subject. I did, however, perform a small experiment for this article and added around 8 oz. (225 g) of hops to 1 gallon (3.8 L) of water, and sure enough it registered on my Anton Paar EasyDens. Extrapolating those readings out to a 5-gallon (19-L) batch we're talking about 1.001 or so. So well below the 0.5 percent ABV limit of the FDA, but enough to have the yeast metabolize and biotransform those delicious hop compounds."*

Vito added 8 oz. (225 g) to 1 gallon (3.8 L) simply to experiment — this is the higher end of what would usually be added to a full 5 gallons (19 L) of hop water. Still, it shows that sugar is indeed present in hops. If "no trace amount" of alcohol is what you are truly after, you can of course make hop water without adding yeast. The trade-off is that you will not benefit from biotransformation (a conversion of neutral or less desirable hop compounds into desirable flavors and aromas). Many homebrewers and pros make hop water without adding yeast. Pick your favorite hop variety, balance the pH of your water, give it a quick boil, add some hops and carbonate! The process without yeast is even quicker and simpler. BYO

contributors

Aaron Hyde began homebrewing in 1996. As the Owner/Operator of Brewstock Homebrew Supply in New Orleans, he sold home fermentation products, helping many get their start in the hobby. Brewstock continues today, but Aaron moved on to work for Briess Malt & Ingredients, where he served as a Sales Director, selling to homebrew stores, as well as craft breweries and distilleries. He then moved to Auckland, New Zealand, to lead sales and global product strategy for Bevie and its brands. In 2021, he authored *How to Distill* for the hobby distiller, and he manages the website www.howtodistill.com, which provides supplementary distilling information. He is currently the Director of Product Portfolio at RahrBSG. He has been a past "Techniques" columnist for *BYO* in addition to writing many feature stories.

Dark malts are the heart of many beer styles, and play supporting roles in many others. Aaron takes a closer look at these specialty malts and ways to incorporate them into your next brew, beginning on page 24.

Gordon Strong is President Emeritus and the highest-ranking judge of the Beer Judge Certification Program (BJCP), the organization that certifies beer judges for homebrew competitions and also registers qualifying homebrew competitions. In addition to his Grand Master Level V judge status, Gordon is a three-time winner of the National Homebrew Competition Ninkasi Award and the author of homebrewing books *Brewing Better Beer* and *Modern Homebrew Recipes*. He has been *BYO*'s "Style Profile" columnist since 2015 and is a frequent feature story author.

In addition to his "Style Profile" column on British strong ale on page 18, Gordon explores brewing Czech-style beers in our cover story beginning on page 30.

Drew Jackson started homebrewing in 2009. After three years making extract beers, he joined forces with another brewer and spent the next three years brewing all-grain beers on a one-barrel system. He then scaled down to a 5-gallon (19-L) induction cooktop system with an Igloo cooler mash tun and a 10-gallon (38-L) brew pot and never looked back. Drew lives and brews in Mendocino on the coast of Northern California. He is a forager and big proponent of farmhouse brewing techniques. He aspires to make beers that taste like the beautiful place he lives.

Beginning on page 52, Drew shares his experience, and those of numerous pro brewers, in search of greater hop expression through dip hopping and coolpooling.

NEWS

INTRODUCING THE NEWEST PUBLIC HOP VARIETY: VERA

Photo by Kayla Altendorf

A new public hop variety known for its sweet, fruity aromas and disease-resistance was released this summer. Vera was developed by the U.S. Department of Agriculture-Agricultural Research Service (USDA-ARS) public hop breeding program, in partnership with the Hop Research Council. Formerly known as HRC 3 or W1108-333, Vera bursts with a complex aroma of tropical, stone fruit, and citrus. It is being lauded by growers for its resistance to hop powdery mildew that is prevalent in the Pacific Northwest and is quickly becoming a popular hop among pro brewers.

Vera was developed as a cross between Brewers Gold and a powdery mildew-resistant male USDA hop in a former Washington State University hop breeding program and was evaluated to its final stages by USDA-ARS. The hop initially gained interest from brewers for its aroma profile, consistently ranking high in comparison to other experimental public hops at sensory events. According to the USDA, Vera is relatively low in alpha acids (3.8% in small plot trials and 5.4% on-farm trials), moderate beta acids (4.6%), and has significantly higher percent co-humulone in the alpha acids (45%), and higher terpene content of linalool (0.85%), farnesene (19.3%), and lower caryophyllene (3.98%) compared with Cascade and Zeus.

The 2024 crop year is the first time Vera is widely accessible, and the Brewers Association is encouraging brewers to give Vera a try by introducing a new one-time category in the 2025 Great American Beer Festival competition exclusively for beers brewed using Vera. The category is open to all styles of ales and lagers provided Vera makes up a large part of the hop aroma and flavor. In addition to being available to pro brewers, Vera is available to homebrewers in smaller quantities easily found online.

The hop is named as a tribute for Vera Katherine Charles — one of three female mycologists who worked at the USDA early in the twentieth century — to recognize the important contributions she and the other women made to the hop industry.

The USDA-ARS hop breeding program focuses on developing new hop varieties with improved disease-resistance, superior agronomic characteristics, and positive brewing attributes. Public varieties are released without intellectual property protection to benefit the entire hop and brewing industries.

WHAT'S NEW

THE HOP PAIRINGS GUIDEBOOK

Hops Direct is sharing a free downloadable hop pairing guidebook with easy hop pairings to help you hit your flavor goals. Whether you're chasing juicy, tropical flavors, crisp citrus notes, or a bit of dank character, the right combo (and timing) can take your brew from good to unforgettable. The pages highlight a handful of varieties that play well together, when to use them in your process, and the beer styles in which they really shine. Find it online here.

ALE ABBEY: IN BEER WE TRUST

Designed by homebrewers, *Ale Abbey: In Beer We Trust* is a video game that puts you in charge of a monastery brewery in the late Middle Ages. It's a tycoon game that lets you create your own ale recipes based on famous styles, brew with the help of your monks and nuns, and expand your influence across neighboring settlements, all while balancing the challenges of running a thriving abbey. The game draws inspiration from real-world traditions. It is available for $14.95 on Steam.

UPCOMING EVENT

OCTOBER 24

NANOCON ONLINE

Learn from craft brewing industry experts with live online sessions covering Brewery Operations, Business Operations & Sales, and Start-Ups. Join nano breweries (and nanos in-planning) online for a full day packed with interactive seminars and Q&A panels geared just for you — the small-scale commercial brewery, or brewery in-planning, working on smaller systems. All sessions will be recorded and available to you for later viewing as a NanoCon attendee so you will not miss any sessions even if they take place at the same time or you can't join live on October 24. Learn more at: www.byo.com/product/2025-nanocon-online

BYO STORY BEHIND THE LABEL

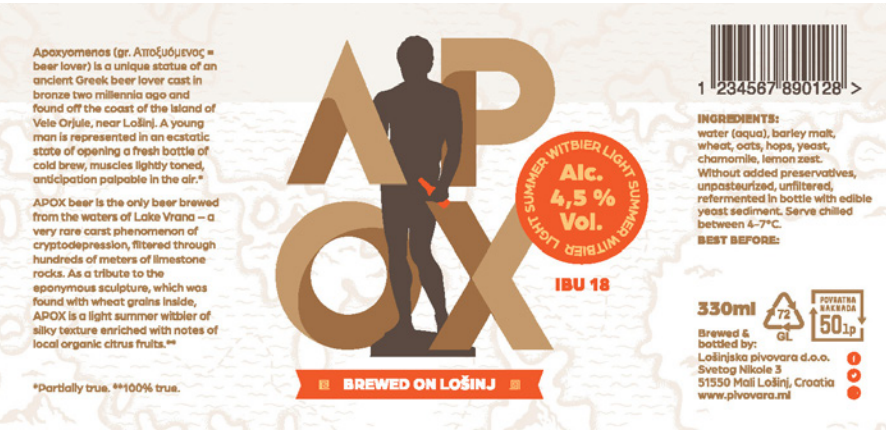
KRUNOSLAV KOPRIVNJAK • MALI LOŠINJ, CROATIA

This label was created by my friend Nikola Šubić based on my idea for a beer I was planning to sell in Croatia on my home island of Lošinj (though it is currently just a label for homebrew).

The label is inspired by the statue of Apoxyomenos found in the sea near the island in 1996, which had several grains hidden inside. It's believed the grains were brought by a rodent (probably a mouse), though in text printed on the label I have woven a story around these grains as raw materials for beer making and have taken the statue as inspiration for the label. I have slightly altered history by telling that the statue has captured a young man in a dramatic moment of opening a fresh bottle of beer.

This label is for a witbier I call Apoxiomenos, and I have adjusted the label for an American pale ale and IPA, which I call APAxiomenos and IPAxiomenos. Each label is similar, though I change the color scheme of each.

The beers are brewed with waters from Lake Vrana — a very rare karst phenomenon of cryptodepression filtered through hundreds of meters of limestone rocks. This witbier is a light summer beer of silky texture enriched with notes of local organic citrus fruits. BYO



BYO REPLICATOR

BY DEREK DELLINGER

DEAR REPLICATOR, I'm researching Sultana™ hops for an upcoming brew and just learned that one of my favorite IPAs uses them. I'd love some tips from Ursa Minor about their Bear Hop IPA. Cheers!

Eddy Kane
Minneapolis, Minnesota

For Ben Hugus, Co-Founder of Ursa Minor Brewing in Duluth, Minnesota, craft beer has been a guiding light; a "north star." Nestled in the Lincoln Park Craft District, Ursa Minor Brewing now aims to serve as a beacon for its entire community, drawing people together through a shared love of well-crafted beer and genuine connection.

"We see ourselves as having found our way home through craft beer and have fallen in love with the community that surrounds the craft industry," Hugus says. "Throughout history, people have found their way home using the North Star as their guide — Ursa Minor, otherwise known as the Little Dipper, is the constellation that contains the North Star (Polaris). Like the North Star, beer has guided us to our home. We hope our beer does the same for others."

Ursa Minor utilizes local ingredients when it can, both for its beer and its popular wood-fired pizzas (the taproom is also a pizzeria).

Like many in the craft beer world, Hugus' journey began with a homebrewing kit and a big dose of scientific curiosity. As a biology and chemistry student in college, he was captivated by the transformative power of yeast. "The almost alchemical flavor changes that yeast can facilitate . . . it is truly inspiring to think that a microscopic creature can make something sweet and intolerably bitter into a complete and beautifully balanced beverage," he says.

This initial fascination blossomed into a lifelong passion and eventually, of course, a professional career. Hugus' approach is simple: "Always pursuing a way to make our beers better, more flavorful, and consistent."

The brewery's ever-evolving beer lineup is guided, in part, by the palates of their patrons. "We really look to our customers to help us decide what we should be pursuing next," Hugus says. "If enough people ask, we start putting time and effort in developing new and fun ways to make that style shine!"

The tap list at Ursa Minor runs the gamut from IPAs and stouts, to Belgian styles, fruited sours, and a fan-favorite cream ale. They also offer hard seltzers and non-alcoholic beer options so everybody can find something to fit their tastes in the tap room.

Bear Hop IPA has been a staple at Ursa Minor almost since its beginning in 2018. When the brewery found itself navigating a market flooded with hazy IPAs, Bear Hop was conceived as a nod to the classics. "The concept was simple: A classic and bitter IPA with a baseline of traditional piney and grapefruit character, but accented with a hint of juicy pineapple," Hugus says. "A beer brewed for the classic IPA lover."

Bear Hop IPA is considered an American IPA, though Hugus notes with its clarity, bitterness, and citrus-forward profile, it could easily be classified as a West Coast IPA as well, a style which seems to be enjoying a resurgence in popularity of late.

The secret to the beer's distinctive pineapple note lies in a specific hop variety — the one that Eddy is asking about. "Sultana™ hops are unique and have a particular pineapple flavor and aroma that is hard to replicate with another hop," Hugus explains. To maximize this characteristic, the brewery employs a targeted approach. "In this recipe, Sultana™ is used only in the dry hop in order to focus on extracting and highlighting this pineapple characteristic in particular."

With so many new hop varieties on the market, it can be difficult at times to pin down new favorites. But Sultana™ — first released under the name Denali by the hop breeding group at Hopsteiner in 2016 and then renamed in 2019 after a naming dispute — has established itself as a hop variety worthy of experimentation. Sultana™ stands out for its gigantic cones (hence its original name, Denali, after North America's largest mountain) and high total oil content.

While pineapple from Sultana™ hops are a huge part of Bear Hop IPA, those flavors are complemented by notes of mandarin orange from Centennial (the only variety added prior to dry hopping) and Amarillo® hops. Both varieties, Hugus says, are great complements to Sultana™.

The intentionality that goes into Bear Hop IPA extends to the brewery's other hoppy offerings as well. Hugus generally sticks to a "less is more" philosophy. "We definitely try to limit the number of different varieties that enter each beer. Only in very special cases do we ever go beyond three hop varieties in a beer."

Hugus' number one tip for homebrewers looking to refine their IPAs is to exercise restraint and intention with their hop additions. "Pick one, two, or maximum three hop varieties and have good reasoning for including each one," he says.

URSA MINOR BREWING'S BEAR HOP IPA CLONE

(5 gallons/19 L, all-grain)
OG = 1.064 FG = 1.012
IBU = 50 SRM = 4 ABV = 6.8%

INGREDIENTS

12 lbs. (5.4 kg) North American 2-row malt
1.3 lbs. (0.6 kg) dextrine malt
6 AAU Centennial hops (60 minutes) (0.6 oz./17 g at 10.3% alpha acids)
6 AAU Centennial hops (30 minutes) (0.6 oz./17 g at 10.3% alpha acids)
6 AAU Centennial hops (15 minutes) (0.6 oz./17 g at 10.3% alpha acids)
2 oz (57 g) Sultana™ hops (dry hop)
2 oz (57 g) Amarillo® hops (dry hop)
2 oz (57 g) Centennial hops (dry hop)
SafAle US-05, Wyeast 1056 (American Ale), or White Labs WLP001 (California Ale) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

With the goal of creating a moderately dextrinous wort, mash in with 2.75 gallons (10.4 L) of 162 °F (72 °C) strike water to achieve a single infusion rest temperature of 151 °F (66 °C). Hold at this temperature for 60 minutes.

With sparge water at 170 °F (77 °C), collect about 6 gallons (23 L) of wort. Bring wort to a boil.

At the start of boil, set a timer for 60 minutes, then add the first Centennial hop addition. Add the second Centennial hop addition at 30 minutes, and the third Centennial hop addition with 15 minutes remaining.

Chill wort to 65 °F (18 °C). Pitch yeast and, if using temperature control, set the fermentation temperature to 68 °F (20 °C). Ferment until gravity is within 1–2 points of your target final gravity.

Add dry hop additions 1–2 days before reaching terminal gravity. Allow the dry hops to soak for 3–4 days before packaging.

URSA MINOR BREWING'S BEAR HOP IPA CLONE

(5 gallons/19 L, extract with grains)
OG = 1.064 FG = 1.012
IBU = 50 SRM = 4 ABV = 6.8%

INGREDIENTS

6.4 lbs. (2.9 kg) extra light dried malt extract
1.3 lbs. (0.6 kg) dextrine malt
6 AAU Centennial hops (60 minutes) (0.6 oz./17 g at 10.3% alpha acids)
6 AAU Centennial hops (30 minutes) (0.6 oz./17 g at 10.3% alpha acids)
6 AAU Centennial hops (15 minutes) (0.6 oz./17 g at 10.3% alpha acids)
2 oz (57 g) Sultana™ hops (dry hop)
2 oz (57 g) Amarillo® hops (dry hop)
2 oz (57 g) Centennial hops (dry hop)
SafAle US-05, Wyeast 1056 (American Ale), or White Labs WLP001 (California Ale) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Place the dextrin malt in a muslin bag. Steep in 2 gallons (8 L) of water at 155–165 °F (68–74 °C) for 30 minutes. Remove the grain bag, placing it in a colander over the kettle, and gently rinse with 1 gallon (4 L) of warm water.

Add water to the kettle to reach a pre-boil volume of approximately 6 gallons (23 L). Bring to a boil, then turn off the heat and carefully stir in the dry malt extract until fully dissolved.

Follow the remainder of the all-grain recipe. BYO

BY DAWSON RASPUZZI

HOPPING FOR BITTERNESS

Rethinking early-boil hop additions

Early-boil hop additions are often called "bitterness additions" as adding bitterness is the primary purpose of this hop charge. That doesn't mean variety and other factors shouldn't be considered at this stage. While some brewers may just grab the hops with the highest alpha acid content, others think more critically about the final impact these early hop additions will have. Two pros share how they approach bitterness additions in their beers.

In my experience there will be a slight contribution of hop character that is reflected in the final product from your bittering additions — specifically tannins and phenolic acids.

Chris Kirk started homebrewing after landing a job sweeping floors and flipping glass at Great Divide Brewing Co. in 2008. He soon worked his way into brewing commercially. After a decade of working in breweries around the world, Chris returned to Denver and co-founded Banded Oak Brewing Co. in 2017. In 2025 he partnered with restaurant and bowling alley The Werks to start Paramount Beerwerks in Wheat Ridge, Colorado.

I like to use Hallertau Magnum as my typical bittering addition hop. I will also often use CTZ or Chinook in my IPAs and double IPAs. However, if I run out of a certain hop variety I would typically use for my bittering addition, I don't worry too much and will substitute another variety to get me to my goal. Choosing a variety with a similar alpha acid percent is ideal, but a quick calculation can make a hop swap no sweat.

In my experience there will be a slight contribution of hop character that is reflected in the final product from your bittering additions — specifically tannins and phenolic acids. Especially if you're bittering with a lower alpha acid hop for higher IBU beers. Bittering additions are typically economical decisions for me, but there are a few beers, typically with high protein additions like wheat or oats, that I like to add more hops with lower alpha acids to create a tighter bind in the boil with more polyphenols, resulting in a tight trub cone in the whirlpool and cleaner knockout.

My bittering additions are typically T-90 pellets. I have used T-45 pellets for bittering additions — the difference is the weight needed to get you to the same IBU. A small bag of hops can go a long way with T-45, but they typically cost more so the economics only make sense if you can find them for a really good price.

I definitely consider the early additions (75/60 minute boil) my main contributors to my IBU levels. I do attribute some bitterness to the flavor and aroma additions though and will factor that into my recipe development. In order to avoid too much contribution, I will design a heavily hopped beer so that I can use top up water at the end of my boil and pump in cold water to get my boil down fast at flame out and will add my whirlpool additions after the temperature of the wort gets down to around 200 °F (93 °C) to reduce isomerization.

I was around during the IBU wars of the 2010's with things like the Alpha King Challenge and tongue numbing bitterness battles that breweries were participating in. I can remember trying beers with upwards of 500 IBUs. Now it's just the opposite and breweries are trying to create massive dry hopping loads in the juicy and hazy IPAs. While my understanding of bittering has not really changed, my practice and philosophy has changed to meet the market demand. I still prefer to make and offer American and West Coast IPAs, but I have dialed my IBUs way down. My first IPA recipe that I was brewing in 2017 when we opened Banded Oak was 65 IBU and now it's down to 26 as I've moved a majority of those early additions to late-boil and dry-hop additions.

My last bit of advice for homebrewers: Watch your pH levels. Alpha acids will have a slower isomerization rate in higher pH worts. And if you're using hop substitutions, always calculate your weights to stay consistent with different alpha acid percents:

New weight =
old weight x (original AA/new AA).

Josh Nard has been brewing professionally in northern Colorado for 14 years. He has been the Head Brewer for Liquid Mechanics Brewing Co. in Lafayette for the last seven years.

I have found hop variety decisions related to additions early in the boil are very important. Oil content, alpha acid content, as well as the amount of certain types of alpha acids play a vital role in bitterness quality of the resulting beer. These "bittering" additions can't be thought of as only for adding bitterness — some hop character definitely makes its way through the boil process from early-boil additions too. I have found the percentage of cohumulone, as well as alpha acid percentage, typically make the biggest impact on the finished beer from this addition. IPAs in particular benefit from the "cleaner," more refined bitterness of a low-cohumulone hop variety, so I usually use Warrior or Simcoe® for IPAs. For traditional lagers or low-ABV ales, I have found lower alpha acid noble varieties impart a more pleasant bitterness. I usually use Hallertauer Mittelfrüh, Tettnanger, or East Kent Golding T-90 pellets for these types of beers. If I really need more alpha acid, I supplement the noble varieties with Zuper Saazer or German Magnum.

For IPAs I have switched to some CO_2 extract for bitterness. The extract seems to bring a little less vegetal bitterness than pellets. It also helps lower the quantity of vegetal matter in the kettle, allowing for better yield. Extract can create an oil slick in the kettle, though, so I typically throw some pellets into the boil with the extract to give that oil something to grab onto and incorporate into the liquid better.

I don't do my bittering charge until 60 minutes into a 90-minute boil for West Coast IPAs. I get about 50% of the IBUs from that 30-minute addition of extract and pellets. I typically round out the rest with T-90 pellets at 15 minutes or later, and I always do a whirlpool addition.

Early in my career it was beaten into us that you need a 60-minute addition for IPAs. That later changed to a first wort hop. I did first wort hopping for a very long time, but it seemed the perceivable Bitterness Units (BUs) varied. I still like a first wort hop addition, but I use them rarely, simply for the ease of IBU calculation. Now, I like a 30-minute bittering addition, followed by lots of late additions. They used to call this "hop bursting."

The landscape of IPA has changed a lot in the last decade or so. People (me included) seem to enjoy lower IBU IPAs with higher dry hop expression. I've learned a lot from brewing New England IPAs. It's all about perceived bitterness and not particularly the calculated IBUs. Bitterness is one of the five basic tastes, and it's not a very pleasant one in most cases. Figuring out how to incorporate bitterness into an enjoyable and refreshing experience is really the key. The less you boil, the more character you get from the hops. Just remember, it also means you get less BUs from the hops, which creates more hop load in the kettle, which I make up for with hop extract.

I have done mash hopping and I really enjoy doing it with whole cone hops. Pellets tend to stick up the mash. I usually wait for the sparge and just cover the top of the grain bed with whole cones. We've done several collaborations where we use mash hopping to mimic a hop back. I don't think it makes a huge difference in the flavor of the beer, but we'll take any opportunity to add even the most subtle hop character. At the very least, it makes the brewery smell amazing!

Let me leave homebrewers with a few pieces of advice. I enjoy the ease of calculating IBUs but it's not something you should be beholden to. Trust your palate and adjust from there. You may find your IPA tastes best at 30 calculated IBUs rather than 80. You may find your Pilsner tastes better at 40 calculated IBUs rather than 30.

Don't be afraid to experiment with all of the new hop products either. Professionals are still figuring out how to incorporate these new products, and homebrewers have a lot of flexibility in how they can experiment with them too. These products are definitely here to stay.

Lastly, make changes incrementally and always experiment. Change one small variable (variety, IBUs, hop product, etc.) and take notes. These small changes will inevitably inform a better product.

HELP ME, MR. WIZARD

BY ASHTON LEWIS

SOURING SOURCES

Plus: Calculating carbs & storing hops

Q I RECENTLY WATCHED ONE OF YOUR BYO+ VIDEOS ABOUT MAKING SOUR BEER. THE SUGGESTION TO USE KIMCHI FOR SOURING BEER BLEW MY MIND! I'M ALREADY MAKING MY OWN KIMCHI, SO I WILL DEFINITELY TRY THIS. HERE ARE MY QUESTIONS: 1. IS THERE ANY TASTE DIFFERENCE BETWEEN USING KIMCHI AND THE *LACTOBACILLI* THAT I CAN PURCHASE FROM A LAB? 2. IF KIMCHI WORKS, WHAT ABOUT TRADITIONALLY SOURED DILL PICKLES, E.G., STRUBBS?

GORD MAXWELL
VIA LIVE CHAT

A I recently talked about this during a BYO Live Chat and thought it would be worthwhile to share some expanded thoughts in writing. Let's start with the idea of using kimchi as a source of bacteria for making sour beer. As a probiotic-rich food, kimchi is a well-established source of various microorganisms believed to promote gut health (*Indigenous Fermented Foods for the Tropics* is a great reference on this). These microbes, many of which are lactic acid bacteria, also happen to be useful in the production of sour beer.

The primary organisms responsible for kimchi fermentation belong to the gram-positive, acid-producing *Lactobacillaceae* family of bacteria, often referred to more simply as lactics. This large and diverse group of bacteria is naturally found in many places, including grains, fruits, vegetables, and even in puddles of fermenting spilled milk. One particularly interesting trait of lactics is that many are heterofermentative, meaning they produce multiple byproducts during fermentation. Depending on fermentation conditions, these byproducts typically include lactic acid, ethanol, and acetic acid. This contrasts with homofermentative lactics, which mainly produce lactic acid. That's enough nerding out for now.

These days, most sour beers are produced using one of two general approaches: Either by purchasing lab-grown cultures or by channeling your inner Tarzan and wrangling wild bugs. Traditional sour beers rely heavily on the Tarzan method, where wort is naturally inoculated by airborne microbes, ingredients, and the unique microflora found in the brewing environment. One of the best-known examples of this method is used by Brasserie Cantillon in Brussels, Belgium. They are legendary for their exceptional wild ales, which have been brewed using largely unchanged techniques for nearly a century. Their brewery sits tucked away in a charming neighborhood surrounded by butcher shops, cafés, and rows of townhouses, blending the old-world craft of spontaneous fermentation with the bustle of modern life.

In more recent years, brewers have adapted this traditional approach by using fermented foods — especially yogurt and kefir — as alternative sources of bacteria for kettle sours. Although these cultured dairy products are often made with blends of commercially available bacteria, to the brewer they are still considered somewhat wild, since the exact composition of the cultures isn't usually known when added to wort. This adds a layer of unpredictability, which can be both exciting and risky.

Over the past 25 years or so, access to specialty cultures of bacteria and yeast has grown dramatically. Today, brewers looking for consistency and control in their funky beers have a wide range of commercial options. In the early days, most of these lab cultures were blends of organisms found in tra-

In more recent years, brewers have adapted this traditional approach by using fermented foods — especially yogurt and kefir — as alternative sources of bacteria for kettle sours.

Photo by Ashton Lewis

Homemade white kimchi alongside bacteria-rich "kimchi juice" that could be used for a kettle sour.

ditional Belgian lambics or blends intended to approximate bugs found in lambics. As time went on, the push for more predictable and faster souring methods led to the rise of kettle souring. This process is popular because it allows brewers to keep the souring bugs contained in the brewhouse, rather than introducing them into the fermentation cellar where cross-contamination is a concern.

Because malt is such a rich source of lactic acid bacteria — including *Lactobacillus delbrueckii*, which is homofermentative, and *Lactobacillus plantarum*, which is heterofermentative — many early kettle souring techniques relied on bugs cultured directly from malt. Today, however, brewers can easily purchase pure lactic cultures from yeast labs. These have largely replaced wild-cultured sources, especially for brewers seeking repeatability and ease of use.

More recently, lactic acid–producing yeast strains have gained popularity. *Lachancea thermotolerans* is a naturally occurring yeast that produces both lactic acid and ethanol and is now available to homebrewers and commercial brewers from yeast labs such as Escarpment Labs and Lallemand. Lallemand also offers a genetically modified *Saccharomyces cerevisiae* strain known commercially as Sourvisiae. This strain has been engineered to express the gene for lactate decarboxylase, an enzyme that converts pyruvate to lactic acid. The main advantage of using *Lachancea* or Sourvisiae in sour beer production is the simplified process compared to kettle souring, with no bacteria introduced into the cellar.

All of this helps explain why the idea of going Tarzan with kimchi as a source of lactics is so appealing for brewers looking for an adventure. Fresh kimchi juice contains a healthy population of lactic acid bacteria. According to the kimchi chapter in *Indigenous Fermented Foods from the Tropics*, cell densities in kimchi typically range from 100 million to 1 billion cells per milliliter. That's an ideal range for brewers looking to propagate a strong bacterial culture for use in beer. You've got plenty of biological firepower in even a small splash of kimchi juice to propagate for use in brewing.

Kimchi is just one of many fermented foods that can be used to wrangle bugs for making sour beer. My general advice is to start with foods that taste good to you. If you wouldn't eat it, don't brew with it. Live sauerkraut, buttermilk, and dill pickles are all viable sources of lactics.

One final, important tip: If you're working with heterofermentative lactics, avoid creating conditions that lead to the production of acetic acid (aka vinegar). These bacteria only make acetic acid in the presence of oxygen, so be sure to minimize oxygen exposure during the souring phase. A sealed vessel and a good dose of CO_2 headspace can help you keep things clean and crisp.

Q TWO NUTRIENT ANALYTICS LABS TESTED MY FIRST ATTEMPT AT A LOW-CARB BEER AND SHOWED ALL SUGARS AND CARBS AS LESS THAN 1 G PER 100 ML. YET IT DOES SPIKE MY BLOOD SUGAR SEVERELY. ACCORDING TO BREWFATHER, MY RECIPE SHOULD HAVE 3.6 G OF CARBS PER 100 ML. ARE THE LABS MISSING SOME TYPE OF SUGAR OR CARBS?

PIETER DE WEERDT
VIA LIVE CHAT

A This is a great question that affects beer lovers of all sorts, especially those of us who keep a watchful eye on our blood glucose levels. Unfortunately, I cannot provide any specific details about the data you received from the labs who ran your testing with the available information. It does seem unusual that beer with 1 gram of carbs per 100 mL would cause a spike in your blood glucose. As a comparison, commercially produced light/low carb beers brewed in the U.S. contain between 0.7 – 1.9 grams of carbs per 100 mL of beer. Although I cannot provide information about the past, I can comment on differences between expectations and measured values, how to estimate carbs, and a few ways to reduce them in beer. Let's begin with predictions.

Recipe calculators use predictive equations to estimate alcohol and residual extract based on the original gravity and predicted final gravity. Because malt specifics, mashing particulars, and water chemistry can all affect wort fermentability, predicting final gravity is not much more than a guess. Furthermore, yeast strain, pitching rate, and yeast nutrients influence residual carbohydrates left behind after fermentation. In my experience, making assumptions about fermentation is not as approximate as assumptions about wort composition. That said, predicting final gravity is approximate.

A better way to estimate alcohol and residual carbohydrates is to use a model that uses both original extract/gravity, and apparent extract/gravity. Two estimates I feel comfortable using are the following developed by Gary Spedding because I bumped these calculations against known beer data and they provide solid estimates. Although the original publication in *Brewers Digest* cannot be found online, this article in *Brewers Journal* contains Spedding's calculations. There are two equations in this article for alcohol by weight (ABW) and it is the second that should be used (I converted equations from the original reference into a spreadsheet years ago and know that there was some sort of editorial confusion in the referenced article).

$$\text{Real Extract} = (\textit{Original Extract} \times 0.1948) + (\textit{Apparent Extract} \times 0.8052)$$

$$\text{Alcohol by Weight} = 0.8052 \times (\text{Original Extract} - \text{Real Extract}) / 2.0665 - (1.0665 \times \text{Original Extract} / 100)$$

Here is what the math above reveals about a typical beer-flavored beer with a wort gravity of 11 °Plato and a final gravity of 2 °Plato. Note that I have not included specific gravity equivalents because the equations above use Plato for the calculations, but for those curious we are talking about

1.044 OG and 1.008 FG. Also note that the units on Plato are grams extract per 100 mL of beer or percent by weight.

Real Extract = (11 x 0.1948) + (2 x 0.8052) = 3.74 °Plato

Alcohol by Weight = [0.8052 x (11 – 2)] / [2.0665 – (1.0665 x 2/100)] = 3.5% ABW (g/100 mL)

Alcohol by volume is equal to ABW / 0.79 (the density of ethanol), and 3.5% ABW equals 4.5% ABV. I only show ABV because it is the most common unit used to express alcoholic strength in beer, wine, and spirits. However, when it comes to calculating grams of residual extract and calories, percent by weight is the value to use.

The term real extract is used to define dissolved solids in beer, which are mainly comprised of carbohydrates but also include protein, minerals, and hop acids. For your inquiry, it is safe to assume that 100% of the real extract can be attributed to carbs because that slightly overestimates the value.

We have determined that beer with an OG of 11 °Plato and a final gravity of 2 °Plato contains 3.7 grams of carbs per 100 mL of beer and 3.5% ABW. Carbs contain 4 kcal/gram and alcohol contains 7 kcal/g, giving the beer in this example 39.3 kcal/100 mL of beer or 140 kcal per 12-oz. (355-mL) serving.

In my experience, a lab analysis should provide data that is similar to what is calculated above provided you are producing beer that falls into the typical range of beers found in the market. Spedding's calculations are based on beer data and do not work for completely fermentable solutions. Without knowing the original extract and apparent extract of your beer, I don't know if the Brewfather prediction is off or if the labs are off. Run the numbers to see which set of data seems most plausible.

I am guessing from your question you may use a continuous blood glucose monitor. I use one of these devices and have learned a lot about how different foods and beers affect my blood glucose. I feel fortunate to have discovered that my blood glucose was abnormally high a few years ago and to be successfully controlling things with a combination of diet, medication, and monitoring. One thing I learned is my body reacts differently to some beers. When I drink non-alcoholic beers produced using maltose-negative yeast strains, for example, my blood glucose usually spikes because these beers contain all of the maltose and maltotriose that comes with mashing. I also have noted spikes when drinking "normal" beers that have above average final gravities. One hunch that I have with some of these beers is that they have been fermented with yeast strains that do not ferment maltotriose. Unfortunately, this property of yeast strains is not widely published. It is known, however, that many English strains popular among the haze-crazed crowd do not ferment maltotriose.

Methods to lower carbs in beer include extended mash rests in the 140–145 °F (60–63 °C) range, the use of exogenous alpha amylase or amyloglucosidase in the mash or fermenter, substituting sucrose or dextrose/glucose for a portion of malt or malt extract to increase wort fermentability, brewing lower gravity beer styles, selecting high-attenuating yeast strains, and taking advantage of hop creep to dry beers out.

Q

WHAT IS THE LONGEST YOU WOULD STORE HOPS IN THE FREEZER? WOULD THE MAX STORAGE TIME BE DIFFERENT FOR BITTERING VS. AROMA HOPS?

KEN GRACE
VIA EMAIL

A

This question has two very different answers depending on the source of the hops. Let's start with pelletized hops sold to commercial breweries. These hops begin their journey at the farm, where tall bines are cut from the fields and the cones are separated using a picking machine. Although a small number of farmers now use hop combines that cut, pick, and separate leaves and bines from cones, most still use picking machines housed in buildings typically referred to as picking sheds. Once the picker has disassembled the cones, leaves, and bines, a system of belts and blowers separates out the cones.

The next step is hop kilning, where hot, dry air reduces the moisture content to below 8%. After kilning, the dried hops are stored in large piles to allow the moisture to equilibrate. In most parts of the world, the hops are then compressed into bales. Before pellets became the norm, this was the end of the line for most hops: Bales would be stored in warehouses — often warm ones — before being shipped to breweries. It was U.S. brewers who demanded refrigerated hop storage. In fact, U.S. hop processors routinely store bales in freezers, whereas German processors typically store them in refrigerators at 36–41 °F (2–5 °C).

Because most hops today are pelletized, bales destined for pellet production are usually stored only briefly before being broken apart using a piece of equipment called a bale breaker. The cones are then milled into powder using a hammer mill. The powder is typically blended in a ribbon-style mixer to reduce variability between bales, then compressed into pellets using a forming die. These days, forming dies are cooled with liquid nitrogen and some processors even cool the hop powder prior to forming. Finally, the pellets are packaged in foil bags. The current standard is to flush these bags with nitrogen gas to create a modified atmosphere that reduces oxidation during storage. For many years, vacuum packing was common, but this method makes the bags prone to damage and can cause pellets to clump together into hard-to-handle masses.

The foil bags of hop pellets are then boxed, palletized, transferred to cold storage, and kept there until shipped to breweries or into distribution channels. Depending on the variety — some hops have better storage properties than others — and the intended use, hop pellets can be stored cold for up to six years. In general, pelletized aroma hops start to fade after 2-3 years of storage and bittering hops can

hold their brewing value up to about six years. Breweries equipped with lab instruments and trained sensory panels routinely sample and analyze their inventory to determine how best to use it. Because hops are used exclusively in beer, breweries contract with growers to ensure a reliable supply. When aroma hops become unsuitable for brewing, brewers may repurpose them for bittering or take the loss. One major advantage of hop extracts is extended shelf life, which is why many larger breweries convert a portion of their inventory into extracts shortly after pelletizing (most extract facilities are designed to process pellets, which are more compact than cones).

I know I haven't answered your question yet, but it's important to understand how pellets are produced and packaged. The issue is this: Pellet bags typically contain 11, 22, or 44 pounds (5, 10, or 20 kg) of hops. Hops sold in the homebrewing market, by contrast, usually come in 1-oz. (28-g) packages. So the obvious question is: How are these 1-oz. (28-g) bags produced?

Typically, they are repackaged from larger bags that are labeled with critical information such as the harvest year, the processor (the company that converts bales into pellets), a lot number, and sometimes a QR code linking to hop analytics. However, not all repackaged pellets retain this vital information. For example, a commercial-sized bag of 2024 Cascade hops labeled with 8.5% alpha, 6% beta, and 1.5% oil might simply become a bag labeled "U.S. Cascade Hops" with a general alpha acid range of 5–9%.

Hops sold to homebrewers are somewhat analogous to growlers or Crowlers™ of beer. While it is entirely possible to repackage hops without increasing oxygen exposure, the risk is higher. This alone likely shortens the shelf life of homebrew hops compared to those sold to commercial brewers. Another issue is the packaging. Foil bags offer excellent gas barrier properties assuming the seal is perfect and there are no pinholes. Plastic bags, on the other hand, offer poor barrier protection, meaning that even a vacuum-sealed plastic bag can still allow oxygen ingress over time.

My advice is to use hops as soon as possible after purchasing, unless they are packed in foil and clearly labeled with the crop year and processor. The challenges of repackaged hops are well understood, and many hop processors serving the homebrew market have responded by labeling their products with the same information as packs sold to commercial brewers.

Hops do go on sale, and good deals can be found. I love a bargain and feel confident buying discounted hops if I know they were packaged by a reputable processor and properly stored throughout their life. That last piece, storage history, is nearly impossible for any buyer to verify, whether homebrewer or pro. That's why it's good brewing practice to smell your hops before use. If you open a bag and something seems off, it's your call: Repurpose the hops for bittering or make the executive decision to toss them. BYO

BY GORDON STRONG

BRITISH STRONG BITTER

ESB or English Pale Ale?

Strong bitter is the strongest member of the bitter family of cask ales in the U.K., being greater than 4.5% ABV.

STRONG BITTER
BY THE NUMBERS

OG:	1.048–1.060
FG:	1.010–1.016
SRM:	8–18
IBU:	30–50
ABV:	4.6–6.2%

Photo courtesy of Shutterstock.com

Strong bitter may not be the most familiar member of the British bitter family, but you likely know it by its other names: ESB (Extra Special Bitter) and English pale ale. These higher alcohol, more bitter ales have long been exported to the U.S. and elsewhere, so they tended to become more well known and popular. Fuller's ESB is a unique product within the English market, but it served to create a craft beer style in the U.S., at least before IPAs became dominant.

Strong bitter is the strongest member of the bitter family of cask ales in the U.K., being greater than 4.5% ABV – still on the lower end of a standard-strength beer in the U.S. Many say English pale ale is simply the bottled version of a bitter, although that does somewhat ignore history as pale ales were created first. English pale ales were the inspiration for the American pale ale style, which clearly led to additional styles. In the early craft beer days in the U.S., it was quite common for brewpubs to have an ESB on tap — a malty, bitter ale with English malt, hop, and yeast flavors. The strong cask bitters in the U.K., the ESBs in the U.S., and the exported English pale ales all basically are described by the strong bitter style.

The Beer Judge Certification Program (BJCP) prefers not to use ESB as a style name since it refers to a specific trademarked English product, and nobody in the U.K. thinks of it as a style. English pale ale is a better name, although bitter is the name associated with this type of draft or cask beer in its country of origin. Since most American drinkers think ESB means Extra Special Bitter as a generic name, maybe that is what is happening after all. Just understand that it will cause Brits to cringe if they hear ESB used this way. My personal reason to not use ESB as a style name is that it makes judges think of Fuller's ESB, and rarely do other bitters approach that profile.

Strong Bitter is style 11C in the BJCP Style Guidelines, in Category 11: British Bitter. It shares the category with 11A Ordinary Bitter and 11B Best Bitter. The British Bitter category does share a common history and general profile, with the beers primarily being differentiated by alcohol strength.

HISTORY

Bitters in Great Britain are mostly a 20th century phenomenon, but they do trace back to earlier pale ales. Pale malt was invented in the 1600s, so pale beer was not really possible to make before then. Even so, it remained relatively expensive for the next century or two. Pale ale and pale beer existed in the 1700s but it really wasn't like products today. Modern pale ale traces back to the highly hopped beers later known as IPAs sent to India from London starting in the late 1700s.

This export pale ale didn't become available in England until the 1830s, by which time it was being made more in Burton than in London. Railroads in the 1840s and 1850s helped it gain more local markets, and by the 1860s most breweries offered at least one. Before the 1900s, these tended to be higher in alcohol, aged, or keeping beers. Lower gravity unaged (also known as mild or running) pale ales called light bitters or light ales were developed in the late 1800s and are probably the most direct ancestors of modern bitters.

World War I caused gravities to drop in all beer styles, and the resulting compression of gravity ranges caused breweries to drop products that no longer were sufficiently dif-

ferentiated. The lower gravity bitters became increasingly popular, and finally became the most sold style after World War II. Pale ales still existed but were positioned as a bottled, premium product, often for export, which is its current form.

Most authoritative writers on English beer (Michael Jackson, Martyn Cornell, Roger Protz, Ron Pattinson) agree that pale ale and bitter are basically synonyms. More nuanced views emerge as they discuss the products at different points in their evolution, with most agreeing that as of the second half of the 20th century, bitter was basically the draft or cask form, and that pale ale was a bottled product. Earlier usages of the term bitter (in the mid-1850s) existed, but not to describe a style as much as to literally differentiate the sweeter milds from more bitter beers.

Michael Jackson is the source of the term "strong bitter," where he uses it to talk about the differences between them and ordinary and best bitters when breweries offered three products. Many would have only made an ordinary bitter and a best bitter, however. Naming clearly wasn't standardized, so the separation of styles is similar to how the X system was used in the previous century. Remember that in the U.K., beer is priced based on alcohol content, so having ways of highlighting this is important to consumers.

SENSORY PROFILE

Strong bitters are medium to medium-high bitter in the balance, but the malt backbone tempers the impact. Bitterness can rise with the alcohol level and final gravity, with some examples topping out around 50 IBUs (most are lower). The malt profile is British, with bready and biscuity flavors dominating, sometimes with light toast and caramel flavors. Americans tend to overemphasize caramel flavors, often due to their sampling of perhaps oxidized imports. Authentic bitters are generally more fruity than caramelly, which is one reason I recommend seeking out fresh, local examples of beer styles from other countries.

The alcohol level of strong bitter is larger than 4.5%, but stops short of

STRONG BITTER

(5 gallons/19 L, all-grain)
OG = 1.053 FG = 1.013
IBU = 39 SRM = 13 ABV = 5.2%

INGREDIENTS

13 lbs. (5.9 kg) Maris Otter malt
12 oz. (340 g) Crystal malt (70–80 °L)
8 oz. (227 g) flaked maize
5.3 oz. (150 g) Briess Victory® malt
1 oz. (28 g) black patent malt
4.5 AAU Styrian Golding hops (first wort hop) (1 oz./28 g at 4.5% alpha acids)
4.1 AAU Challenger hops (60 min) (0.5 oz./14 g at 8.3% alpha acids)
4.5 AAU Fuggle hops (20 min.) (4.5% alpha acids)
1 oz. (28 g) Styrian Golding hops (0 min.)
1 oz. (28 g) Styrian Golding hops (whirlpool)
Wyeast 1968 (London ESB), White Labs WLP002 (English Ale), Imperial Yeast A09 (Pub), or LalBrew London ESB yeast
¾ cup corn sugar (if priming)

STEP BY STEP

This recipe uses reverse osmosis (RO) water. Adjust all brewing water to a pH of 5.5 using phosphoric acid. Add 1 tsp. calcium sulfate and ¼ tsp. calcium chloride to the mash.

This recipe uses a single infusion mash, with a no-sparge lauter. Use enough water to have a moderately thin mash (2 qts./lb). Mash in the Maris Otter malt and flaked maize at 152 °F (67 °C) and hold for 60 minutes. Add remaining grains, then raise the mash temperature with boiling water to 168 °F (76 °C) and recirculate for 20 minutes.

Drain the kettle completely without sparging. Add brewing liquor necessary to achieve 6.5 gallons (24.5 L) volume in the kettle (do not sparge, add the water directly to the kettle). Boil the wort for 90 minutes, adding hops at the times indicated in the recipe. The FWH hops go in the empty kettle before lautering.

Chill the wort to 66 °F (19 °C), pitch the yeast, and ferment until complete.

Rack the beer, prime and bottle condition, package in a cask, or keg and force carbonate.

STRONG BITTER

(5 gallons/19 L, extract with grains)
OG = 1.053 FG = 1.013
IBU = 39 SRM = 13 ABV = 5.2%

INGREDIENTS

6.5 lbs. (3 kg) Maris Otter malt extract
12 oz. (340 g) Crystal malt (70–80 °L)
5.3 oz. (150 g) Briess Victory® malt
1 oz. (28 g) black patent malt
4.5 AAU Styrian Golding hops (first wort hop) (1 oz./28 g at 4.5% alpha acids)
4.1 AAU Challenger hops (60 min) (0.5 oz./14 g at 8.3% alpha acids)
4.5 AAU Fuggle hops (20 min.) (4.5% alpha acids)
1 oz. (28 g) Styrian Golding hops (0 min.)
1 oz. (28 g) Styrian Golding hops (whirlpool)
Wyeast 1968 (London ESB), White Labs WLP002 (English Ale), Imperial Yeast A09 (Pub), or LalBrew London ESB yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Use 6 gallons (23 L) of water in the brew kettle; heat to 158 °F (70 °C). Steep the crystal, Victory®, and black malts for 30 minutes, then remove.

Turn off the heat. Add the malt extracts and stir thoroughly to dissolve completely. You do not want to feel liquid extract at the bottom of the kettle when stirring with your spoon. Add the first wort hops. Turn the heat back on and bring to a boil.

Boil the wort for 60 minutes, adding remaining hops at the times indicated. When done, chill the wort to 66 °F (19 °C), pitch the yeast, then ferment until complete.

Rack the beer, prime and bottle condition, package in a cask, or keg and force carbonate.

strong ales, generally around 6%. There can be some overlap with English IPAs in gravity, with English IPAs being the classic Burton beer with sulfury notes and a marked hop and bitterness balance. Strong bitters have more of a malt presence. The color is in the amber to copper range, sometimes getting down into deep gold but it should stop short of brown. Clarity is good, and the head is typically low but is carbonation- and service-dependent.

The yeast and hop character can give fruity notes, although the range of English hop characteristics can give floral and earthy notes in addition to fruity notes. I find apple and pear esters more from yeast, with orange and citrus coming more from hops. Stronger bitters can also be dry hopped, so having a fresh hop note. In better pubs, this can be done in the cellar by the publican. The flavor dimension of yeast and hops can exceed the aroma.

The body of the beer can be medium-light to medium-full, with stronger versions often showing more body. Carbonation is lower on draft than in bottled products, but don't expect cask levels of carbonation in bottles. A light alcohol warmth can sometimes be noted in examples in the 6% range, but it isn't required.

The balance should lean bitter, but malt should not be in the background. Malt, hops, and yeast character should be noticeable in the aroma, flavor, and aftertaste. The finish should be dry to medium-dry, and the beer should retain the sessionable qualities of other bitters, albeit at a respectable alcohol level.

BREWING INGREDIENTS AND METHODS

Strong bitters and pale ales are made like other British bitters. The base of pale ale malt is common, with small amounts of character grains or sugars included to enhance flavor and color. Any kind of British pale ale malt can be used; don't think that Maris Otter is a requirement, but those with bready and biscuity flavors are common. Crystal malts can be used in relatively small percentages (often under 5%) to provide additional flavors and darker colors, but so can brewing sugars. Adjuncts such as corn, rice, or wheat can be used as well.

British beers are generally infusion mashed, with some commercial versions still being parti-gyled (making multiple beers from one mash through separate boils and blends). Single infusion mashes as used commonly by American homebrewers are more than sufficient for making most British beers. Bitters are typically dry, so a conversion temperature within a few degrees of 151 °F (66 °C) is common.

While the range of hops is broader than in the past, most judges and consumers expect a British character to the hopping. Varieties like Goldings and Fuggle are traditional, but a range of English hops are available and can be used. There is more experimentation now with modern or American-type hops, but for competition I try to stick with traditional English varieties.

Most hops are added as a bittering addition when brewing strong bitters. This style does not typically have a huge late-hop aroma and flavor, so traditional flavor and aroma hopping techniques can be used. Dry hopping is relatively rare, but can be done (often by adding hop plugs to a cask). This isn't to say that American craft brewers haven't been adding more hops near the end of the boil or as dry hop additions, but understand that is not traditional.

Versions meant to evoke Burton-on-Trent can have a more drying, sulfate character, with the water being treated with calcium sulfate, but not all versions of bitter need have a Burton water character. I tend to think this character is better suited to English IPAs, particularly in competition. Using water with more calcium chloride gives a rounder impression, which can enhance the malt flavors.

British yeast strains are often associated with certain breweries, which can influence your choice. I'm fond of the fruity Fuller's strain (Wyeast 1968 or White Labs WLP002) as my main English yeast, but I also like Wyeast 1335 (British Ale II) as a balanced yeast. Wyeast 1318 (London Ale III) tends to make a malty beer, while Wyeast 1469 (West Yorkshire Ale) seems minerally to me. Wyeast 1028 (London Ale) can be a bit sulfury but does a great job attenuating. Any of these, or their equivalents from other yeast manufacturers, can work with this style very well.

HOMEBREW EXAMPLE

This is a fun recipe with some unusual techniques, so please read carefully. If you are using recipe software, set your mash efficiency to 48% because we are using a no-sparge technique. This involves using a thin mash, running off the entire mash without sparging, then topping off the beer with strike water in the kettle to hit the initial volume. It is best to prepare all brewing liquor with acid and salts rather than just the mash. The flavor quality of the malt will be superior, and is akin to using first runnings from a large brew. However, some grain will be sacrificed in this method; hence, the lower efficiency.

I am using classic English ingredients in the recipe, with the exception of Victory® malt, which is a U.S. malt from Briess designed to enhance the biscuity/toasty English flavor profile that many judges prefer (myself included). My personal preference of maltsters for the base malt and crystal malt is Crisp. I'm using the Fuller's yeast strain, which gives a nice fruitiness, and is very easy to clear in a cask. Classic English hops are used, with the addition of some late Styrian Golding, a personal favorite.

This was a recipe I originally put together for serving a cask ale at the old Real Ale Festival, where it was served on a hand pump from a pin cask. I was happy to see the beer pour bright after a single glass, once it had been set up in its serving location the night before and stored cold. It was crushed the next day with help of a small gaggle of Englishman who spent the entire festival next to the cask. That's the kind of validation that works for me. BYO

Related Link:

• *Re-familiarize yourself with British hop varieties from the landrace era like Fuggle and East Kent Golding to those bred in the 20th century such as Brewers Gold and Challenger at:* **www.byo.com/article/classic-british-hops**


BYO NANO CON ONLINE
OCTOBER 24, 2025
SMALL-SCALE CRAFT BREWING
• Full-Day of Live, Online Seminars and Q&A Panels
• Access to Video Recordings and Course Materials of All Sessions
• 3 Learning Tracks: Business & Sales, Brewing Operations, Start-Ups
• Get Your Questions Answered Live by Craft Beer Experts
• Interact with Other Small-Scale Craft Brewers & Breweries-In-Planning
• Q&A Sessions with Leading Small-Scale Brewing Suppliers
REGISTER NOW & SAVE!
NanoCon.beer
Brought to you by
Brew Your Own
THE HOW-TO HOMEBREW BEER MAGAZINE

Seminar Descriptions

October 24, 2025

11:00 a.m. – 12:00 p.m. (Eastern)

SETTING UP A SMALL-SCALE QC LAB

▶ *BREWERY OPERATIONS*

Even the smallest of breweries need to run certain quality control tests on their beer and can without taking up too much space, resources, or cost. QC expert Audrey Skinner will walk you through the tests and equipment you need to make sure the beer you are selling to customers is the best it can be.

AUDREY SKINNER,
GASTRONOMICAL CHEMIST, IMBIBE SOLUTIONS

IDENTIFYING & FIXING INEFFICIENT PARTS OF YOUR BREWERY BUSINESS

▶ *BUSINESS OPERATIONS & SALES*

Unless you take a step back and can take an objective view of your brewery business you can't identify the areas that need improvement. Brewery finance guru Audra Gaiziunas will show you how to strategically look for inefficient parts of your brewery and then what you can do to fix those problem areas.

AUDRA GAIZIUNAS,
OWNER, BREWED FOR HER LEDGER, LLC

START-UP TAPROOM FINANCIALS

▶ *START-UPS*

Learn what the key accounting and financial guidelines should be for your new taproom so you can be in a better position to make smart and accurate decisions in the first few months and years of your brewery. Understand the numbers-side of your taproom business model before you ever pour your first pint with brewery financial expert Kary Shumway.

KARY SHUMWAY,
PUBLISHER, CRAFT BREWERY FINANCE

12:15 – 12:45 p.m. (Eastern)

Q&A WITH NANO VENDORS

You can check in live with your choice of top craft brewing vendors to get your questions answered about Nano-sized equipment, gear, ingredients, and supplies.

1 – 2 p.m. (Eastern)

5 THINGS YOUR TAPROOM STAFF SHOULD BE DOING

▶ *BUSINESS OPERATIONS & SALES*

Your taproom doesn't need a complete overhaul to start seeing better results. It just takes a few intentional changes. In this session, we'll walk through five simple things your staff should be doing every shift to help guests have a better experience, increase tabs, and keep people coming back. It's not complicated, but it is backed by years of real data from Secret Hopper visits across the country. You'll get to see exactly how small shifts in staff behavior led to bigger results for their team. Taproom data can be your secret to success. Join us for actionable strategies to build more memorable and profitable guest experiences.

ANDREW COPLON
FOUNDER, SECRET HOPPER
FOUNDER, CRAFT BEER PROFESSIONALS

REFINING RECIPES

▶ *BREWERY OPERATIONS*

Part of a brewer's skill is the ability to take a favorite beer recipe and be able to improve it with small adjustments. Learn the best strategic way to approach taking your existing recipes to the next level with pro brewer and head of the American Brewers Guild, Steve Parkes.

STEVE PARKES
BREWMASTER & OWNER, DROP-IN BREWING COMPANY
OWNER & LEAD INSTRUCTOR, AMERICAN BREWERS GUILD

HIRING & MANAGING TEAM MEMBERS

▶ *BUSINESS OPERATIONS & SALES*

Hiring and managing brewery staff is one of the more challenging parts of running a small business. Wrong moves can not only hurt your business but also land you in legal troubles. Learn helpful guidelines to limit your risk and find greater success with your co-workers that are often on the frontlines of how customers view your brewery.

MATTHEW MCLAUGHLIN
FOUNDER, MCLAUGHLIN, PC

2:15 – 2:45 p.m. (Eastern)

Q&A WITH NANO VENDORS

You can check in live with your choice of top craft brewing vendors to get your questions answered about Nano-sized equipment, gear, ingredients, and supplies.

3 – 4 p.m. (Eastern)

BUILDING TAPROOM COMMUNITY THROUGH LOCAL COLLABORATION PANEL

▶ *BUSINESS OPERATIONS & SALES*

Hear stories from fellow Nano Brewers on ways they connected with their neighbors and local organizations to create new customers while turning their taprooms into a resource that serves the community and also helps their own bottom line.

JOHN HOLL
HOST, BYO NANO PODCAST
EDITOR, ALL ABOUT BEER

4:15 – 4:45 p.m. (Eastern)

Q&A WITH NANO VENDORS

You can check in live with your choice of top craft brewing vendors to get your questions answered about Nano-sized equipment, gear, ingredients, and supplies.

5 – 6 p.m. (Eastern)

OWN YOUR BACKYARD: LOCAL MARKETING THAT ACTUALLY WORKS FOR TAPROOMS

▶ *BUSINESS OPERATIONS & SALES*

No fluff, no big budgets — just real strategies to make your taproom the heartbeat of the neighborhood. This session breaks down how to build brand awareness and drive foot traffic using smart, resource-friendly local marketing. You'll learn how to connect with the right partners, show up where your community is already paying attention (online and off), and use digital tools to turn local attention into in-person visits. Whether you've got one person or just one hour a week to dedicate to marketing, you'll leave with a clear plan to grow your brewery's presence in your own backyard.

JULIE RHODES
OWNER, NOT YOUR HOBBY MARKETING SOLUTIONS

DIP HOPPING

▶ *BREWERY OPERATIONS*

Dip hopping originated in Japan but is becoming increasingly popular in North America. Learn more about how to use this technique in your Nano brewery to boost pleasant hop aromas while suppressing or removing unpleasant off-flavors, like myrcene, and aromas that are derived from fermentation.

ASHTON LEWIS
MANAGER OF TRAINING AND TECHNICAL SUPPORT, RAHR BSG
TECHNICAL EDITOR, BREW YOUR OWN MAGAZINE

PLANNING & PREPARING FOR A BREWERY EXIT PLAN

▶ *BUSINESS OPERATIONS & SALES*

The reality is it takes just as much planning and strategic work to exit your brewery business successfully as it did to start it up. Whether you are selling your brewery or deciding to close your doors, how well you prepare and plan for the final goodbye will have a huge impact on your own finances.

AUDRA GAIZIUNAS
OWNER, BREWED FOR HER LEDGER, LLC

Fade to Black

Using Dark Specialty Malts

by Aaron Hyde

The quintessential flavor and color of a Guinness Irish stout. The rich maltiness of an American amber. The crisp, dry finish and mild roast flavor of German schwarzbier. Using dark specialty malts and grains in brewing is not only a requirement for darker styles, but also a secret weapon amongst many amateur and commercial brewers for medium-colored and even some lighter styles. These roasted malts and grains significantly enhance the color and complexity in a beer. And there are other reasons to incorporate these roasted dark malts and grains into your recipes, whether you are brewing all-grain or supplementing an extract-based batch with dark specialty grains. Let's examine these dark malt attributes a bit closer.

WHY USE DARK SPECIALTY MALTS?

Flavor Complexity

Dark specialty malts add a range of rich, nuanced flavors that are difficult to achieve with lighter malts alone. Depending on the type of dark malt used, you can impart notes of chocolate, coffee, caramel, toffee, and even subtle smokiness to your beer. This can make your brews stand out with unique and memorable profiles.

Color Enhancement

Dark malts can transform the color of your beer, providing deep amber, brown, or even jet-black hues. This is particularly important for specific styles such as porters, stouts, and brown ales, where a darker color is characteristic. The visual appeal of a beautifully colored beer can be just as important as its taste.

Aroma

The aromatic properties of dark malts are as significant as their flavor contributions. They can impart a delightful roasted aroma to your beer, enhancing the overall sensory experience of drinking your brew. Imagine the enticing smell of roasted coffee or chocolate wafting from your glass — it's an experience that captivates the senses.

Mouthfeel and Body

Dark malts can contribute to a fuller body and smoother mouthfeel in your beer. Through complex proteins and sugars, they often add viscosity and richness, making the beer feel more substantial and satisfying. This is especially desirable in beers meant to be sipped and savored, such as big stouts and barleywines.

Head Retention

Dark roasted barley malts contain proteins and polyphenols, as well as protein-polyphenol complexes. These are especially abundant in roasted barley, chocolate malt, and similar dark roasted malts.

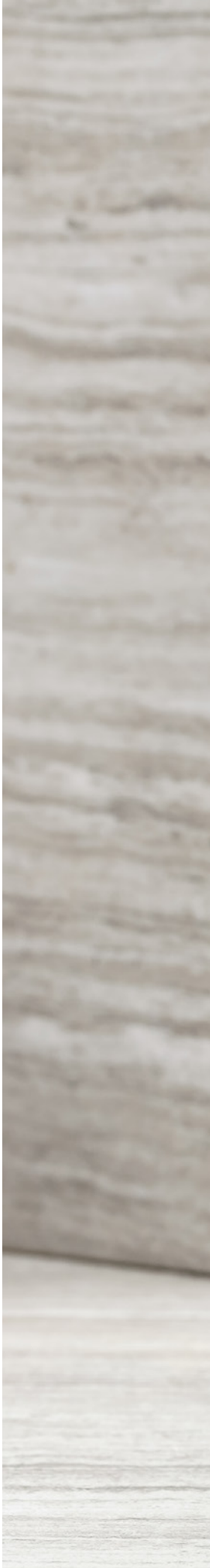


Photo by Charles A. Parker/Images Plus

These surfactants, or surface-active complexes, reinforce foam structure as they settle to the surface of the beer and interact with air and CO_2 providing foam stability. Caramel malts contain melanoidins, browned sugars and amino acids, that are also surfactants. Generally, roasted malts will have some intact proteins or melanoidins, meaning they are excellent for contributing head retention!

Historical and Style Accuracy
Many classic beer styles historically include dark malts. If you're aiming to brew authentic versions of these styles, using the appropriate dark specialty malts is essential. Whether you're crafting an English porter, an Irish stout, or a Belgian dubbel, choosing the most suitable dark specialty malts help you achieve the authentic taste and appearance that defines these beers.

Balancing Sweetness
The bitterness from dark malts can help balance out the sweetness from lighter malts and adjuncts, which is even more important in styles without a lot of bitterness from hops. This balance is crucial for creating well-rounded beers that aren't overly cloying. The roasted bitterness can act as a counterpoint to residual sugars, creating a more harmonious flavor profile.

Experimentation and Creativity
Homebrewing is as much about creativity and experimentation as it is about following recipes. Incorporating dark specialty malts gives you a broader palette of flavors and aromas to experiment with. You can create unique brews that are entirely your own, pushing the boundaries of traditional styles or inventing new ones.

HOW DARK MALTS ARE MADE

Dark specialty malts start the same way as most malted grains — first with steeping, then germination, and finally kilning. However, the key difference is in the final step of roasting (or sometimes extended kilning) at very high temperatures. Although we refer to these grains as specialty malts, some are simply raw roasted grain, like roasted barley. For our purposes we'll refer to them as a category as dark specialty malt. Let's take a look at how these dark malts get made.

Steeping and Germination - Growing in the Grain
Chocolate malt and black malt start the same as any pale base malt. The grain is steeped to increase moisture content and to initiate germination. This builds up enzyme levels and prepares starches for potential sugar conversion.

Once done hydrating and beginning to grow, or "chit," the grain is moved to germination beds to grow. This is where enzymes are activated; however, we are less concerned about that for dark specialty malt, as these will be deactivated during roasting. After a few days, this "green malt" is moved to kilns or, in the case of caramel (or crystal) malts, directly to the roaster.


Photo by Aaron Hyde
Dark specialty malts are often considered those within the massive range of 30–600 °L.

Kilning and Roasting - Drying the Grain
Kilning is how base and light-colored malts are made and may be a first step for many dark specialty malts. Whether kilned at lower temperatures (usually below 250 °F/121 °C) or moved from germination, most traditional specialty malt is made in a drum roaster similar to those used for coffee or nuts. The grain is tumbled and heated in the drum until it reaches a target temperature and color range. Temperatures and humidity in the drum are closely controlled and vary greatly, with a typical range of 250–600 °F (121–315 °C). This high-heat treatment causes a range of chemical changes that are important for the flavor and attributes of dark specialty malt:

- **Maillard reaction:** (Non-enzymatic browning) produces complex flavors like toast, chocolate, and biscuit.
- **Caramelization:** Occurs when sugars melt and brown, producing sweet caramel and burnt sugar notes.
- **Pyrolysis:** Near-combustion and carbonization of the grain, resulting in bitter, dry, and burnt coffee-like flavors.

Caramel or crystal malts are drum-roasted wet to convert starch to sugar inside the husk. This is the same basic mashing (saccharification) process that brewers do. This sugar then caramelizes during roasting, producing a glassy crystal core.

In contrast to caramel, a toasted malt involves taking a malt that has been dried and "finished" in the kiln, and then dry roasting it in a roaster. This imparts an entirely different flavor and spectrum of colors as well. You can experiment with this at home by taking your own base malt and spreading it evenly ¼-inch (6-mm) deep in a baking tray and putting it in your oven for 10–15 minutes at 250–350 °F (121–177 °C). Watch your malt closely to ensure it doesn't begin to burn!

TYPES OF DARK SPECIALTY MALT AND THEIR USAGE

In contrast to base malt, which makes up the bulk of a grain bill and is used primarily for its enzymes and fermentable sugars, dark specialty malts

Popular Dark Specialty Malt Types and Their Uses

Dark Specialty Malt Category	Flavor Attributes	Color Range (°L)	Popular Malts	Beer Styles	Recommended Usage Rate (% of total grist)
Toasted Malt	Biscuit, bread crust, nutty, cracker-like	30–60 °L	Biscuit, Victory®, Amber	English Bitter, Brown Ale, Amber Ale, Märzen	3–8%
Chocolate Malt	Cocoa, dark chocolate, mild coffee, nutty	160–480 °L	Chocolate, Pale Chocolate, Debittered Chocolate, Dark Chocolate	Porter, Stout, Brown Ale, Dunkel	3–8%
Black Malt	Burnt toast, acrid, sharp roast, bitter	400–650 °L	Black Patent, Black, Debittered Black	Stout, Black IPA, Robust Porter, Dark Lager	1–4%
Caramel / Crystal Malt	Caramel, toffee, dark sugar, raisin, burnt sugar	5–250 °L	Caramel or Crystal 40/60/80/120 °L, Caramunich®, Special B, Medium Crystal, Dark Crystal	IPA, Pale Ale, Amber, Brown Ale, Barleywine, Belgian styles	2–15%, depending on °L
Roasted Barley & Other Grains	Espresso, dry roast, burnt sugar, intense bitterness	300–650 °L	Roasted Barley, Carafa®, Roasted Wheat	Irish Stout, Foreign Extra Stout, Imperial Stout, Black Lager	1–6% (Roasted Barley); up to 8% with dehusked variants

do more with less, imparting large amounts of color, flavor, aroma, body, and head retention at less than 20% of the overall grain bill. Light specialty malts are generally defined as having a color below 30 °L; dark specialty malts usually fall within the massive range of 30–600 °L.

Due to this range, the differences in their sugar contribution, fermentability, color, and flavor vary widely.

PUTTING DARK MALTS TO USE

Dark specialty malts are versatile. How you incorporate them into your brewing process can affect your beer's final character. Whether you're brewing with extract or all-grain, there are a variety of ways to maximize those attributes of flavor, aroma, and color. You can also minimize harshness or astringency if you pick the appropriate method of use. The nice part about dark specialty malt is that almost all of it doesn't need a traditional mash process (check if there is starch content in the manufacturer's specs, these may contribute more from mashing), so you can be creative in how you steep and extract flavor and attributes from this malt. Next, we'll get into some methods worth trying in your next batch.

For extract brewers, specialty grains are the go-to method for adding flavor complexity and depth.

EXTRACT BREWING METHODS

- **Traditional Steeping:** Most dark malts are ideal for typical hot steeping. Add the crushed grains to a mesh bag and steep at 150–160 °F (65–71 °C) for 15–30 minutes before removing and rinsing the grain bag with a couple quarts or liters of 150–170 °F (65–77 °C) water. Then proceed to the boil. Be sure the steep temperature stays below 170 °F (77 °C) or you may get some harsh tannins and acidic notes from roasted grains.
- **Fast Steeping:** Use the above traditional method for a very short time. By limiting the total steeping time to only 2–5 minutes, you'll avoid extracting too many tannins or getting any harsh notes from dark malts. This method is ideal for dark and black roasted malts. It will keep the flavor well-balanced and is best when color is the main reason for using your dark malts.
- **Cold Steeping:** Similar to traditional steeping, this method can be done before boiling. This is best done with dark malts that may contribute to harshness or astringency. Add the crushed grains to a mesh bag and steep at 50–70 °F (10–21 °C) for 30–45 minutes. Be sure to mix and move the grain bag around to make sure the proteins and other components are thoroughly diluted into the water. Cold steeping can be used with caramel malts and other lower color roasted malts, but the efficiency of providing sugar, flavor, color, and other attributes might be limited without a good rinse, using a couple quarts or liters of cold water. Cold steeping can also be done in the fermenter after fermentation is complete, or as you add the wort, in the first 30–45 minutes. Sanitize a steeping bag and add your grains. Your wort will be more susceptible to infection, so be as sanitary as possible if you choose this method. The added benefit is that your roasted grains will never be exposed to boiling, which means you won't be getting any harshness and astringency. If doing this with caramel malt, realize you may be adding a small amount of additional sugar.

ALL-GRAIN BREWING METHODS

All-grain brewing gives you full control over dark specialty malt integration and balance.

- **Traditional Specialty Malt Use:** Crush and add to your mash tun with all other malts and grains and proceed with your mash schedule and saccharification as usual.
- **Late Mash Addition:** Add your dark specialty malt during the last 10 minutes of the mash or even just during mash-out (sparge/vorlauf). This limits extraction of astringent compounds and leads to smoother roast profiles, which may benefit certain styles.
- **Cold Steeping:** Prior to mashing, cold steep your dark specialty grains for 30–45 minutes at 50–70 °F

(10–21 °C) and then remove the grain. Use the water as part of your usual mashing regimen. As described earlier in the Extract Brewing Methods section, you can also steep these dark malts in the fermenter as well.

BEER STYLE – EXAMPLE USAGES

Although the dark specialty malt chart on the previous page describes a significant number of dark beer styles that require the use of dark specialty malt, there are many styles that benefit greatly from their use. Outside of the classics like Irish stout that require roasted barley, or robust porter and the prolific use of black malt, some popular medium-colored beers that use dark specialty malt are:

- **Red Ale** — Irish and American red beer recipes often need dark specialty malt to impart a red hue. Although there are now malts designed to contribute a significant red hue, the classic method used by brewers is to add about 8% crystal 40 °L and 2% chocolate or roasted barley malt to a 90% base malt grain bill.
- **American Pale Ale** — Crystal 60 °L (and Crystal 40 °L) has long been the balance to a heavy amount of hops in pale ales. Use a medium crystal, something in the range of 30–70 °L at a rate of about 5% of the grain bill to really balance your hops perfectly.
- **Barleywine** — This big beer is meant to be malty. A heavy dose of dark crystal malt (80–150 °L) is often added at a rate of 3–5% of the grain bill. One trick savvy brewers use is adding 1% of a black malt to not only balance the sweetness with some acidic dark malt, but to impart a nice orange to brown hue in the beer.
- **Belgian Dubbel** — This style loves dark specialty malts of all kinds. A pinch of a toasted malt like amber (1–2%), a dash of chocolate malt (2–3%), heavier amounts of Special B or another dark caramel (5–8%), and maybe even some medium caramels like Caramunich® (4–6%) and *voila!* A beautiful Belgian Dubbel. For those looking to experiment with different dark specialty malts that lean heavily into fig, raisin, and other dark caramel notes, this is an ideal style.

1. MASH

Water for mashing is added to the 3-in-1 and heated. The Mash Colander is inserted into the 3-in-1 and grain is added. Mash temperature is precisely regulated by the temperature controller and heating element.

2. LAUTER

When mashing is complete, the grain is removed by raising the Mash Colander. The wort filters through the spent grain and into the 3-in-1. Sparge water can be added to rinse the grain as the Mash Colander is raised.

3. BOIL

Boiling in the 3-in-1 provides perfect, chemical-free sanitation. Once boiling is complete, the wort is chilled by passing cold water through the 3-in-1 jacket.

4. FERMENT

When the wort reaches yeast-pitching temperature, protein is removed out of the bottom and the wort is aerated. Fermentation temperature is precisely regulated with the temperature controller and jacket.

RECIPE

Midnight Rider Robust Porter

(5 gallons /19 L, all-grain)
OG = 1.065 FG = 1.015
IBU = 35 SRM = 33 ABV = 6.5%

Like Belgian dubbel, robust porter is another one of those styles that allows you to play around with a wide variety of dark specialty malts. The style is quite open to malt usage interpretation, allowing the rich complexity of these malts to shine through. This recipe utilizes five different dark specialty malts to add body, enhance head retention, and impart a deep, rich, dark flavor.

INGREDIENTS

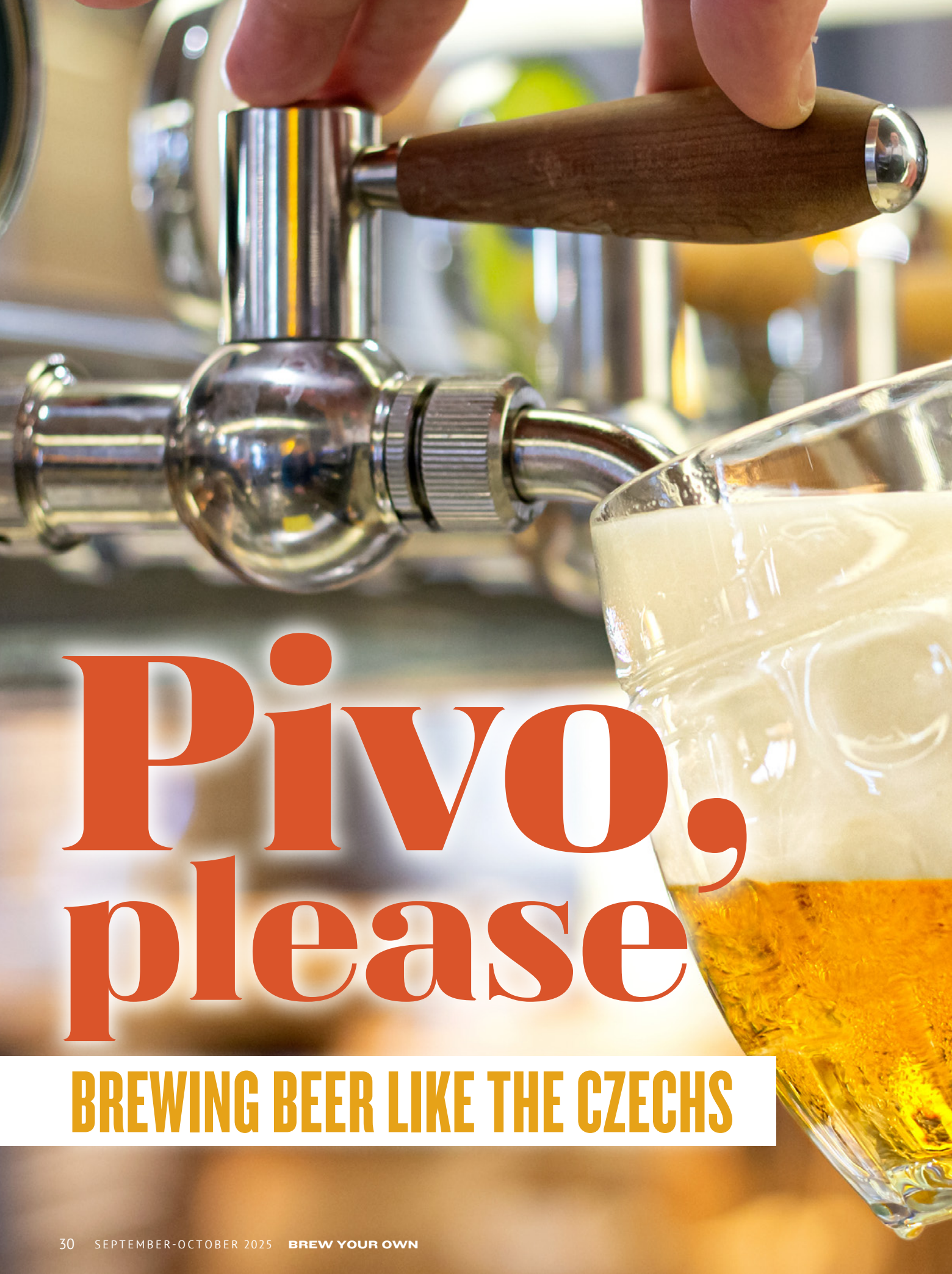
9.5 lbs (4.3 kg) pale ale malt
12 oz. (340 g) chocolate malt (350–400 °L)
8 oz. (227 g) roasted barley (500–600 °L)
8 oz. (227 g) crystal malt (80 °L)
8 oz. (227 g) Special B® malt
4 oz. (113 g) black malt (optional for dryness)
5 AAU East Kent Goldings hops (60 min) (1 oz./28 g at 5% alpha acids)
2.3 AAU Fuggle hops (30 min) (0.5 oz./14 g at 4.5% alpha acids)
0.5 oz. (14 g) Fuggle hops (5 min)
½ tsp. yeast nutrient (15 min.)
Wyeast 1098 (British Ale), White Labs WLP007 (Crisp English Ale), or LalBrew Nottingham yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Mash grains at 152 °F (67 °C) for 60 minutes with 3.5 gallons (13.2 L) of water. Sparge with 3.5 gallons (13.2 L) water to collect ~6.5 gallons (25 L) pre-boil wort. Boil for 60 minutes, adding hops and yeast nutrient on schedule.

Cool wort to 68 °F (20 °C), pitch yeast, and aerate thoroughly if using liquid yeast. Ferment at 68–70 °F (20–21 °C) until complete (~14-21 days). Keg and force carbonate or bottle with priming sugar.

Extract with grains version:
Steep specialty grains in 2.5 gallons (9.5 L) water at 152 °F (67 °C) for 20 minutes. Remove grains, turn off heat and stir in extract until dissolved. Proceed with boil instructions and recipe as above. BYO



Pivo, please

BREWING BEER LIKE THE CZECHS

Photo courtesy of Shutterstock.com

by Gordon Strong

When American craft brewers discuss influences from other countries' historical brewing traditions, you can expect them to mention England, Germany, and Belgium. But how many would include the Czech Republic (Czechia)? I have a feeling that many Americans think of Czech beer as just German beer made with soft water and Saaz hops. While those are certainly part of the story, there is a lot more to Czech beer than that.

České pivo (Czech beer) is actually recognized as a protected geographical indication (PGI) within the European Union, which gives it the weight of law. Its definition lists quality parameters, production methods, and ingredient limitations, as well as sensory aspects that distinguish it from other European beers. Not all beer in Czechia meets these criteria, but those that use the protected name certainly do. It's like a trademark or appellation; it protects the intellectual property of the product, and guarantees that it meets defined quality standards.

While this all sounds like legalese, it does actually provide concrete evidence for something that I have been claiming for a long time — that Czech brewers have a tradition of decoction mashing, and it is an important part of their national beer character. Decoction mashing refers to removing a portion of the mash, typically a third, bringing that portion to a boil for a set time, and remixing it with the main mash to achieve a higher rest temperature The definition of *České pivo* mandates that a decoction mash (single, double, or triple) MUST be used. We'll get into the other aspects of the beer, but this is very important.

CLASSIFICATION OF CZECH BEER

Czechia uses a matrix of color and original gravity (measured in degrees Balling, which is equivalent to degrees Plato and Brix) to classify beers. The colors are *světlé* (pale), *tmavé* (dark), and *polotmavé* (amber, or literally, half-dark). A small number of beers may be described as *černé* (black), but this is basically a synonym for dark. The gravity classes are known as *stolní* (table beer, less than 6 °Plato/1.023 OG), *výčepní* (draft, 7–10 °Plato/1.027–1.040 OG), *ležák* (lager, 11–12 °Plato/1.044–1.048 OG), and *speciální* (special, 13 °Plato/1.053 OG and greater). Porter is a subset of special beers that is a dark beer greater than 18 °Plato/1.074+ OG, but there are many other types of strong lager.

The use of gravity bands to define beers is not uniquely Czech — Germany uses a similar system of *schankbier, vollbier,* and *starkbier.* But the Czechs display the gravity more prominently, and often use the number as the name or identifier for the beer. The *výčepní* and *ležák* class beers are more commonly found, as are the *světlé* and *tmavé* colors.

You'll notice that "Pilsner" isn't used as a name of any of these beers, as it is in other countries. In Czechia, Pilsner means Pilsner Urquell, the beer from *Plzeň* (Pilsen). Similar beers are called *světlé ležák,* or pale lagers. Judges and brewers outside Czechia commonly call them either Czech Pilsners or Bohemian Pilsners, particularly when trying to distinguish them from German Pils or American Pilsners. As a sidenote, Pilsner is sometimes spelled Pilsener; both are correct.

The Beer Judge Certification Program (BJCP) differentiates *výčepní* beers as Czech pale lagers (Style 3A) and *ležák* as Czech premium pale lagers (Style 3B), avoiding the use of Pilsner as the style name out of respect for the origin of the style. The other defined Czech styles are Czech amber lager (Style 3C) and Czech dark lager (Style 3D). These are a subset of beers made in Czechia, but have been enough to drive interest in commercial brewers making these styles elsewhere.

The Czech styles listed in the BJCP guidelines represent a necessary collapsing of multiple categories of Czech beer to facilitate judging. Just be aware that the defined styles represent ranges of beers, and that multiple types of beer can fit within each category. As with most styles, the range of commercial examples can vary quite a bit, so it's easy to find examples with differing balances, amounts of bitterness, and varying levels of sweetness or dryness in the finish.

Photo courtesy of Shutterstock.com

Světl *(pale) and* tmavé *(dark) lagers in the* výčepní *(draft, 1.027–1.040 OG) and* ležák *(lager, 1.044–1.048 OG) classes are the most common Czech styles.*

Saaz hops grown in the Žatec region are the most popular among Czech beer styles and are often dried and then used as whole cones in brewing.

CHARACTERISTICS OF CZECH BEER

I tend to talk about Czech beer characteristics in both absolute and relative terms. Absolute when they can be quantified, but relative to German because they are often better known and serve as a useful frame of reference. To me, the biggest sensory difference about Czech beer compared to German is the mouthfeel. Czech beers have a fuller body and finish with a higher unfermented residual extract, which can sometimes be perceived as sweetness. Czechs describe their beer as having a fullness on the palate. On an absolute basis, the body is medium-to-full for many beers.

Czech beers are generally well-hopped and have a medium to high bitterness (standard-strength lagers can range up to 45 IBUs). The bitterness is not harsh, however, and the impression of bitterness is somewhat tempered by the fuller finish. Czech beer tends to have a higher finishing pH and polyphenol (tannin) level, which can also give a fuller mouthfeel and a reduced crispness.

Paler Czech lagers tend to have a deeper color than similar German beers due to decoction mashing, which often pushes them more into gold and even bronze and away from the straw to yellow colors of German lagers. Dark Czech lagers are rarely black, with dark brownish colors being the norm. Good clarity is prized, particularly in pale lagers.

Czech beers have a creamy head with a rich, natural foam, and are well carbonated. The foam is often accentuated by the characteristic Czech side pull taps (sometimes called LUKR taps, after the popular LUKR manufacturer that makes them). These taps have a ball valve that allows for a variable flow rate, as well as micro screens that normalize bubble size as the beer is dispensed. These features allow for pours with a varying amount of foam, which customers can request. Compare these to the standard North American beer tap faucet, often known as the Perlick style after the most common premium brand. Read more about the popular Czech pours in the sidebar on page 34.

PRODUCING CZECH BEER

The ingredients in Czech beer produce much of the character and are specified within the PGI. The gold standard for hops is the Žatec (Saaz) variety and region, although hops from other Czech hop-growing areas are allowed. Whole hops are typically used. Dry hopping (or any cold-side hopping) is not used. First wort hopping — adding hops to the kettle before or during lautering, prior to the wort being brought to a boil — is a technique known to Czech brewers, and is often used to produce a smoother bitterness.

Pale malt of the Pilsner type from Czech regions is used. The English influence is present in the kilning methods, which aided in the development of the first pale lagers. As I previously mentioned, decoction mashing is required. Czechs believe that double decoction is preferable to single decoction, but some products (notably Pilsner Urquell) are still triple decocted. Czech malts tend to have lower levels of proteolytic modification, which favors a lower level of attenuation in the finished beer.

Compared to German beers, more caramel and dark malts are used in darker beers with less of a Munich/Vienna-type malt base. Pilsner-type malt (even if called "pale malt") is the

Czech Beer Pours

By Bill Jablonski

A perfectly poured pint can be a thing of simple joy. But what is a perfectly poured pint? In many parts of the world it looks like a beer with two fingers of foam sitting on top. Poured into a clean, style-appropriate glassware, the beer with a beautiful crown of foam on top is a thing of beauty.

There may be no place in the world where beer presentation is more appreciated, critiqued, and talked about than the Czech Republic. Here, there are three primary (and at least two more, less common) types of pours, each resulting in a different amount of foam atop the glass and resulting in differing flavors when the same beer is poured each way.

The key to pouring beer with varying and exacting levels of wet foam is the uniquely designed side-pull faucet. We will discuss the faucets more later, but the so-called "wet foam" is much more dense/frothy than traditional draft foam and looks like a steamed milk. In addition to creating a silky clean surface on top of the beer, the foam serves to keep the beer fresher for longer, protecting it from oxygen and keeping the CO_2 in the beer. The pours are one of the key pillars of Czech beer culture.

Before we get into the specific beer pouring types, we should consider what beer foam is and why it matters. Carbon dioxide gas (CO_2) is dissolved within the beer. The dissolved gas in the liquid beer is carbonic acid, and its low pH provides the bite and twang within all carbonated beverages. Flat beer tastes sweet because the acidic backbone that balances the malt sweetness is missing. Beer foam is CO_2 gas that has made a temporary stop between being dissolved in liquid and being released into atmosphere. As the gas bubbles explode in the nose and on the tongue, we experience some of this acidity. Quality malt, quality brewing technique, and a little bit of protein and hop acid structure help to retain a tight foam. Brewers using low-quality ingredients can add foam stabilizers, but nobody is fooled. Let's get on to these unique Czech pours:

***Hladinka* (smooth)**
Roughly one-third foam and two-thirds beer. The foam is produced first, and the clear beer follows, being poured beneath the foam by submerging the extended faucet below the foam to the bottom of the glass. Foam floats and this sequence makes sense. It is said that the creamy head balances the bitterness and sweetness of the beer. This beer pour is essentially a typical North American pour, only more foam.

***Šnyt* (split)**
Similar to the *Hladinka* but more foam — anywhere from half to two-thirds of the glass is foam (it's split between beer and foam, hence the name). That's a lot of foam. Czechs like this style as a less filling drink. This is the default pour at many places in the Czech Republic.

***Mliko* (milk)**
Mliko is the word for milk in Czech, so you can see where this one goes. All foam, tight and intended to be consumed quickly. Sometimes as a dessert beer (because we are in the Czech Republic). This pour is so striking that it defies expectations and is worth the effort. Because the beer-to-foam ratio is slight, one serving is quite slim on actual liquid beer. This is not the worst thing after a long evening of indulgence.

***Čochtan* (neat)**
Beer with no foam. No fun. The Czechs don't particularly care for it either.

***Nadvakrát* (twice)**
Similar to the *Hladinka*, only a short pause between the first foam pour and the subsequent beer pour. The pause is intended to let some of the gas escape, making for a less carbonated beverage and a little easier digestion. A niche within a niche, but a distinction with merit.

SIDE-PULL FAUCETS

OK, how do you produce these wonderful Czech-style pours at home? You'll need the special Czech side-pull beer faucet on your home draft system. Bottle-conditioned beer or a normal faucet can't be substituted, unfortunately.

There are some options for side-pull faucets. LUKR (all caps) is the go-to. This faucet has the specialized mechanism that allows for a forced, thick, creamy head. It works a bit like a dimmer switch and makes some spectacular wet foam, with an extended spout that gets to the bottom of the glass, allowing beer to be poured beneath the foam. It does come with a very steep $400 price, and homebrewers (or anyone using these faucets) must keep in mind that the cool side-pull handle demands a lot of real estate (though they do have an option that is designed to take up less space). The Euro-to-domestic shank adapter that puts an already long faucet towards 1976 Elvis Cadillac length will also demand a drip tray upgrade.

Beyond LUKR, other routes to go are a CBS Beverage or a Micromatic clone. Not quite as cool. Not quite authentic. But all the performance, with a domestic threaded shank, for about $300 less.

The Czech Republic produces lager beer almost exclusively, and it's most often of the pale (*světlé ležák*) variety. That said, there is nothing stopping us homebrewers from experimenting with a variety of styles here, and I expect as more beer bars offer Czech pours, we will start to see the techniques applied to different styles.

So how do you perfect these pours? There are numerous videos online, but this is the part that you, the homebrewer, gets to discover. Open the faucet just so, control the flow exactly as needed to get the foam you're looking for, and then adjust the faucet so the beer flows, raising the foam to the top of the glass. Get to be the resident expert, and then impart that wisdom to the next brewer in your circle. Enjoy the magic of homebrewed beer, personally served to friends and family.

Photo by Tad Donovan Photography

Mliko, šnyt, *and* hladinka *are the three most common Czech pours.*

typical base. Richness is gained more through malting and decoction methods, which develop flavor as well as body and color. Roasted malts, when used, tend not to have burnt flavors. Czech beers are all malt; no sugars or adjuncts are used.

Water is described as soft-to-medium hard, with that from Pilsen being quite low in minerals. Bottom-fermenting lager yeast is used, with three common strains being available to Czech brewers. Their yeast strains tend to have lower attenuation than many German strains, and are often described as not being as "clean." Czech beer can have a threshold buttery character from diacetyl that enhances caramel flavors and body when fresh, but should not have a strong or harsh quality. This profile tends to be desired by Czech consumers.

Czech beer undergoes a two-stage fermentation process, basically fermentation and lagering. The maximum fermentation temperature allowed is 57 °F (14 °C) but is traditionally cooler and slower, often below 50 °F (10 °C). Lagering is conducted at near-freezing temperatures and is often lengthy, until quality parameters are met. Open fermentation is still a technique practiced by many Czech brewers.

The historic cellar of Pilsner Urquell beneath the brewery still has a selection of large oak barrels in use where visitors can sample fresh, unpasteurized beer.

HISTORICAL EVOLUTION

While there is evidence of brewing in Czechia for more than 1,000 years, modern Czech beer is inextricably linked to the Pilsner origin story. As we all know, Josef Groll first brewed Pilsner Urquell in 1842 in Plzeň, marking the start of popularizing pale lager. Using kilning techniques learned in England (then still the British Empire) and bottom-fermenting lager yeast obtained in Bavaria (then still a kingdom, as Germany didn't become unified until 1871), local ingredients and Central European methods of the time were used to develop industrial brewing.

Czech beer continued to develop and expand in influence in Central Europe as lager brewing became more popular and consumer tastes for paler beer grew. However, modernization in brewing all but ceased in what was

The world-class 13° dark lager brewed by 500-year-old Pivovar U Fleků in Prague is a benchmark for the style.

Industrial Lagers Remain King in the Czech Republic

by Jakub Neužil

The Czech Republic is globally known for their great-quality and affordable lagers. Despite the old saying that beer in Czech is "cheaper than water," this has not been true for several years now. However, many of the country's industrial breweries have been less impacted by price increases than other manufacturers of consumer goods, offering a decent quality beer for everyone at an affordable price — just like the Communist government wanted it during the 41 years of dictatorship (from 1949–1989). As an economist, I always find this fascinating as this model did not last in any other post-Communist country or merchandise category. Beer remains the "liquid bread," and for a lot of people is not even thought of as an alcoholic beverage. Many, including myself, still remember the early 2000s when, as children, we used to run to the store to buy beer for our fathers. That's how deep it is rooted to Czech culture and society.

Now, just one generation later, keeping in mind the general inflation caused by COVID, decrease in consumption due to Gen Z spending priorities and health concerns, and particularly high inflation in the gastronomy business (38% officially, therefore the move from on-trade consumption to retail), the big corporate breweries adapted, but where are the craft breweries? How do the 500 smaller Czech craft small beer producers survive with only a 4% market share in the country?

Usually, craft beer is stronger in countries where the big industrial lagers don't offer a whole lot of flavor. A small segment of beer enthusiasts, tired of the boring industrial lager possibly brewed by the same corporation in every country, supports and is willing to pay more for more interesting flavors. But Czechs are different. A very unique case of high-quality industrial lager combines with the small segment looking for even higher quality and variety of styles. And to be honest, since the country's market has been dominated by Pilsner Urquell (part of Asahi Group) for so many decades, it has had a very strong impact on the Czech perception of quality beer. Czechs are proud of it and see it as something the other breweries globally should copy (which is what actually happened after they brewed the first Pilsner in 1842). This position remains unshaken and despite being challenged by other famous Czech brands (e.g., Budvar, Staropramen, Bernard . . .), Pilsner Urquell has remained the gold standard for the Czech people, including craft beer lovers, which can be easily witnessed during the last weeks before Christmas when every supermarket chain tries to sell Pilsner Urquell multipacks in promotion expecting high sales of their other merchandise (a very smart marketing move), and in summer when we pack full trays of beer cans into our cars on the way to Croatian beaches.

So circling back to the question put forward at the beginning: Craft breweries can be successful. And they are. But they are trapped between two trends: 1. The average Czech likes beer, but probably just a lager with approximately 40 IBUs, and expects a decent price, craft or not. And an even lower price if the beer is not Pilsner Urquell. 2. A small community of craft beer fans are looking for something new, but this group is not big enough to create a demand for the craft beer output to be very successful.

The result of these two trends means to be successful as a craft brewery you have to produce a good lager, upon which you will be judged by the people. And you must not just have it in the portfolio, it must be a vast majority of your production in order to pay the bills. And despite the expense to brew the beer being much higher than Pilsner Urquell's, you must sell it for the same price, if not less. Only after that is the craft brewery able to focus on the minority of their output in IPAs, pale ales, stouts, sours, and other more flavorful styles for the craft crowd looking for something different.

And where are homebrewers in this?

Many homebrewers share the same dream: To one day have their own brewery where they will brew beer professionally on a bigger scale and share with the world their amazing recipes.

As an economist and a business consultant, I have worked with a lot of people with this dream. We often met in their small garage brewery, tasted several beers, and talked about their hopes, wishes, and plans. And in a vast majority of cases I heard the wish — "I want to brew a high-quality light, cheap lager that is the best in the country." To that, I explain the efficiency triangle where each point of the triangle represents a different quality, but which each point can be only paired and never be all three of the points. At the end of the points are: Low price, quality, and speed. So, just like in any other industry, nothing can be made in a cheap and fast way with high quality, just like nothing can be made fast with high quality but cheap, etc.

This moment in the consultation is always the conjunction of the two groups, two trends so typical for the Czech customers. And the same applies to pubs and restaurants. Even craft beer bars must respect the role and reputation of the leader and price sensitivity of the customers. There are cases in which pubs sell beer just to cover the cost and only make money on food sales.

With an even more difficult path to profit for startup craft brewers, it means homebrewing is less a trajectory to going pro, but a hobby just done for fun. And that's how it should be in this economic situation. Or, in my case included, it should be an eyeopening path to deeper knowledge of beer and brewing.

Pilsner Urquell sets customer expectations high, making it difficult for newer breweries to compete in a country used to high-quality, affordable lagers.

then-Czechoslovakia in the late 1930s as it first was occupied by Germany, and later came under communist control until the peaceful Velvet Revolution of 1989.

This unfortunate 40+ years of Czech history did have the effect of creating a kind of time capsule of brewing. Brewing in the Czech Republic of the 1990s resembled Bavarian brewing pre-WWII. This preservation of traditional beer production methods is one important aspect of modern Czech beer. While it is reasonable to see a common origin of German and Czech brewing traditions, the split almost a hundred years ago created differences that are still noticeable today. German brewing modernized and changed, while Czech brewing preserved many of the more historical and traditional ways that distinguish Czech beer today (learn more about Czech beer culture and the influence history has played in the sidebar on page 36).

While there may not be explicit stylistic links between German and Czech beer, I often think about the parallel nature of many styles. Take a German/Austrian style of today and apply the Czech national character to get a modern Czech style: German Pils and Czech pale lager, German dunkel and Czech dark lager, Vienna lager and Czech amber lager, Baltic porter (or possibly doppelbock) and Czech porter. The cited styles, even more so when considering their strength variations, do reflect a national brewing character that is worth understanding and appreciating.

FINAL COMMENTS

Prior to the 2015 BJCP Guidelines update that increased the awareness of traditional Czech styles beyond beers like Pilsner Urquell, it was often hard to find examples of Czech beers in the U.S. You could find some mentions in Michael Jackson's books, but it was hard to find examples you could buy in stores or brewpubs. I'm happy to see so many U.S. (and elsewhere) craft breweries who are attempting Czech styles, especially those that are either specializing in them or in lager beer production in general.

I had wanted to introduce Czech styles (at least the dark lager) in the 2004 guidelines, but I was met with resistance because they either weren't being entered in competitions or weren't available as imports. I'm glad the BJCP has become more of an international organization since that has encouraged the exploration of more world beer styles and a better understanding of brewing traditions of important countries in the development of modern beer.

There is still more Czech beer to explore and understand, and the BJCP guidelines are just hitting some of the highlights at the moment. Don't let the beer styles defined for homebrew competitions give you an incomplete understanding of the range of Czech beer. Those with a taste for travel can seek out local examples, of course. For those who wish to research further, the writings of Evan Rail, Ron Pattinson, and Jeff Alworth are always informative.

Czech Pale Lager

(5 gallons/19 L, all-grain)
OG = 1.048 FG = 1.012
IBU = 43 SRM = 5 ABV = 4.7%

INGREDIENTS

9.75 lbs. (4.4 kg) Czech Pilsner (Bohemian pale ale) malt
8.6 AAU Czech Saaz hops (first wort hop)
(2.25 oz./64 g at 3.8% alpha acids)
2.9 AAU Czech Saaz hops (60 min.)
(0.75 oz./21 g at 3.8% alpha acids)
1 oz. (28 g) Czech Saaz hops (whirlpool)
White Labs WLP802 (Czech Budejovice Lager), Wyeast 2000-PC (Budvar Lager), or Mangrove Jack's M84 (Bohemian Lager) yeast
¾ cup corn sugar (for priming)

STEP BY STEP

This recipe uses reverse osmosis (RO) water. Adjust all brewing water to a pH of 5.5 using phosphoric acid. Add 1 tsp. of calcium chloride to the mash.

This recipe uses a double decoction mash, with some step mashing. Use enough water to have a moderately thin mash (2 qts./lb.). Mash in the Pilsner malt at 131 °F (55 °C) and hold for 10 minutes.

Pull the first decoction, resting it at 149 °F (65 °C) for 15 minutes and 162 °F (72 °C) for 15 minutes, before boiling for 15 minutes. Mix the decoction portion back with the main mash. The mash should now be at 149 °F (65 °C). Allow the mash to rest for 15 minutes.

Pull the second decoction, resting it at 162 °F (72 °C) for 15 minutes, before boiling for 15 minutes. Mix the decoction portion back with the main mash. The mash should now be at 162 °F (72 °C). Allow the mash to rest for 15 minutes.

Drain a thin portion of the mash, bring to a boil, and return to the main mash to raise the mash temperature to 170 °F (77 °C), then recirculate for 20 minutes.

Add the first wort hops to the kettle. Sparge slowly and collect 6.5 gallons (24.5 L) of wort. Boil the wort for 90 minutes, adding hops at the times indicated in the recipe.

Chill the wort to 54 °F (12 °C), pitch the yeast, and ferment until complete. Rack the beer and lager at 32 °F (0 °C) for 4–8 weeks.

Rack the beer, prime and bottle condition, or keg and force carbonate.

Photo courtesy of Shutterstock.com

(5 gallons/19 L, extract only)
OG = 1.048 FG = 1.012
IBU = 43 SRM = 5 ABV = 4.7%

INGREDIENTS

6.6 lbs. (3 kg) light liquid malt extract
8.6 AAU Czech Saaz hops (first wort hop)
(2.25 oz./64 g at 3.8% alpha acids)
2.9 AAU Czech Saaz hops (60 min.)
(0.75 oz./21 g at 3.8% alpha acids)
1 oz. (28 g) Czech Saaz hops (whirlpool)
White Labs WLP802 (Czech Budejovice Lager), Wyeast 2000-PC (Budvar Lager), or Mangrove Jack's M84 (Bohemian Lager) yeast
¾ cup corn sugar (for priming)

STEP BY STEP

Use 6 gallons (23 L) of water in the brew kettle; bring to a boil and then turn off the heat. Add the malt extract and stir thoroughly to dissolve completely. You do not want to feel liquid extract at the bottom of the kettle when stirring with your spoon. Add the first wort hops. Turn the heat back on and bring to a boil.

Boil the wort for 60 minutes, adding remaining hops at the times indicated.

Chill the wort to 54 °F (12 °C), pitch the yeast, and ferment until complete. Rack the beer and lager at 32 °F (0 °C) for 4–8 weeks.

Rack the beer, prime and bottle condition, or keg and force carbonate.

CZECH RECIPES

Czech Dark Lager

(5 gallons/19 L, all-grain)
OG = 1.052 FG = 1.014
IBU = 30 SRM = 27 ABV = 5%

INGREDIENTS

5.7 lbs. (2.6 kg) Czech Pilsner (Bohemian pale ale) malt
3.3 lbs. (1.5 kg) Czech Munich-type malt
1.7 lbs. (750 g) Czech crystal malt (60–70 °L)
8 oz. (227 g) Czech debittered black malt
3.8 AAU Czech Saaz hops (first wort hop)
(1 oz./28 g at 3.8% alpha acids)
3.8 AAU Czech Saaz hops (60 min.)
(1 oz./28 g at 3.8% alpha acids)
1 oz. (28 g) Czech Saaz hops (5 min.)
White Labs WLP802 (Czech Budejovice Lager), Wyeast 2000-PC (Budvar Lager), or Mangrove Jack's M84 (Bohemian Lager) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

This recipe uses reverse osmosis (RO) water. Adjust all brewing water to a pH of 5.5 using phosphoric acid. Add 1 tsp. of calcium chloride to the mash.

This recipe uses a double decoction mash, with some step mashing. Use enough water to have a moderately thin mash (2 qts./lb.). Mash in the Pilsner and Munich malts at 99 °F (37 °C) and hold for 10 minutes. Raise the mash temperature to 127 °F (53 °C) and hold for 15 minutes.

Pull the first decoction, resting it at 145 °F (63 °C) for 15 minutes and 163 °F (73 °C) for 15 minutes, before boiling for 15 minutes. Mix the decoction portion back with the main mash. The mash should now be at 145 °F (63 °C). Allow the mash to rest for 15 minutes.

Pull the second decoction, resting it at 163 °F (73 °C) for 15 minutes, before boiling for 15 minutes. Mix the decoction portion back with the main mash. The mash should now be at 163 °F (73 °C). Allow the mash to rest for 15 minutes.

Add the crystal and dark malts. Raise the mash temperature to 170 °F (77 °C) and recirculate for 20 minutes.

Add the first wort hops to the kettle. Sparge slowly and collect 6.5 gallons (24.5 L) of wort. Boil the wort for 90 minutes, adding the remaining hops at the times indicated in the recipe.

Chill the wort to 50 °F (10 °C), pitch the yeast, and ferment until complete (which could take up to two weeks). Rack the beer and lager at 32 °F (0 °C) for 13 weeks.

Rack the beer, prime and bottle condition, or keg and force carbonate.

(5 gallons/19 L, extract with grains)
OG = 1.052 FG = 1.014
IBU = 30 SRM = 27 ABV = 5%

INGREDIENTS

3.7 lbs. (1.7 kg) light liquid malt extract
2.3 lbs. (1 kg) Munich liquid malt extract
1.7 lbs. (750 g) crystal malt (60–70 °L)
8 oz. (227 g) debittered black malt
3.8 AAU Czech Saaz hops (first wort hop)
(1 oz./28 g at 3.8% alpha acids)
3.8 AAU Czech Saaz hops (60 min.)
(1 oz./28 g at 3.8% alpha acids)
1 oz. (28 g) Czech Saaz hops (5 min.)
White Labs WLP802 (Czech Budejovice Lager), Wyeast 2000-PC (Budvar Lager), or Mangrove Jack's M84 (Bohemian Lager) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Use 6 gallons (23 L) of water in the brew kettle; heat to 158 °F (70 °C). Steep the crystal and black malts for 30 minutes, then remove.

Turn off the heat. Add the malt extracts and stir thoroughly to dissolve completely. Add the first wort hops. Turn the heat back on and bring to a boil.

Boil the wort for 60 minutes, adding remaining hops at the times indicated.

Chill the wort to 50 °F (10 °C), pitch the yeast, then ferment until complete. Rack and lager for 8 to 12 weeks at 32 °F (0 °C). Prime and bottle condition, or keg and force carbonate. BYO

Photo courtesy of Shutterstock.com


BLICHMANN
BrewKeg 12.5
BrewBuilt
SPIKE
DELTA BREWING SYSTEMS
BRÄU SUPPLY

HOMEBREW UNITANK COMPARISON

A survey of small-scale pressurizable unitank fermenters

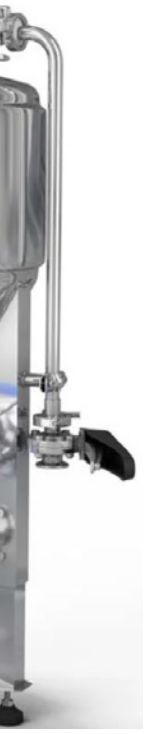
by Dawson Raspuzzi

I love walking into a tap room for the first time and immediately being hit with the recognizable aromas that so often fill my own brewing space. Wort boiling, fermentations cranking along, and raw ingredient smells filling the air means that the beer I'm going to be served is fresh. But the smell of a brew day in the tap room also means the brewing space is nearby and there's a good chance I'm going to be able to see where and how the beer is made. Nothing beats sipping on a brew while gazing at a brewery's equipment — from nano-sized operations with one or two fermenters next to a kettle and mash tun, to those with rows of giant conical fermenters stretching high into the air like Corinthian columns. The fermenters are usually the first thing to catch my eye — they're shiny and full of gadgets, gauges, sight glasses, and ports . . . they seem to blur the line between brewery equipment and art.

Of course, you don't need to visit a pro brewery to admire them. Homebrewers have access to the same type of unitank fermenters, and their popularity has grown tremendously over the past decade so the options available have a wide range of features, add-on components, and price points.

Unitanks are the top tier fermenter option for homebrewers. They open the door of opportunity with the multi-functionality they offer. They hold pressure, which allows homebrewers to carbonate in the fermenter or do pressurized fermentations to suppress esters or create lager-like beers at ale fermentation temperature. Those with conical designs make trub and yeast management easy, and many include dump ports that allow homebrewers to remove the trub while conditioning and to harvest yeast for additional use. Closed transfers can be done easily, minimizing oxygen contact with your beer. And these are just the basics.

For this compilation, we gathered information on the most popular pressurizable unitanks available to homebrewers in North America so readers can compare their advertised features. From the size and price point to included or available accessories, number of ports, valve sizes and more, there is a lot to consider when choosing a unitank that meets your needs. We hope this helps clarify what you get with each option.



BLICHMANN CORNICAL™ UNITANK

The Cornical™ Unitank is a 7-gallon (26.5-L) pressurized tank with the unique design of a full-featured conical bottom clamped to a Cornelius-style keg top. Rated for 50-PSI pressure capability, the Cornical™ Unitank retails for $467.99. Blichmann Engineering also offers the modular keg and the conical fermentation kit as separate products for added versatility. The keg system has a removable bottom to allow easy access when cleaning. The conical bottom clamps onto the keg to convert it to the pressure-fermenter, so if you have multiple kegs you can use one fermentation kit and switch the unitank bottom to a regular keg bottom after fermentation is complete for easy serving from a kegerator. It also features a rotating racking arm, 1.5-inch (3.8-cm) butterfly dump valve for yeast harvesting and trub dumping, and a traditional Corny-style keg lid. Available add-ons include a spunding valve and a keg wall hanger.

VISIT WEBSITE

BLICHMANN FERMENATOR™ G4

The Fermenator™ G4 is the latest iteration of the first pressure-capable conical to hit the homebrew market back in 2004. It comes in four sizes ranging from 7 gallon/26.5 L ($768.99) up to one barrel ($1,538.99). Each features welded 1.5-inch (38-mm) tri-clamp fittings, an aseptic racking valve that can be filled with sanitizer between uses so all wet surfaces remain sanitized, an external level gauge, and is rated for pressure up to 15 PSI. It has a brushed exterior that is easy to keep free of stains and fingerprints and a polished interior. It comes with the pressure relief valve, tri-clamp thermometer, and a lifetime warranty. Additional features sold separately include a tri-clamp blow-off tube, caster set, leg extensions, cooling coil, carb stone, and Clean-In-Place set.

VISIT WEBSITE

BRÄU SUPPLY UNITANK

This professional-style, 304 stainless steel jacketed unitank comes in four sizes from an 8-gallon capacity up to 39 gallons (30- to 150-L) and ranges in price from $1,800–$2,500. It features a liquid-filled jacket for precise temperature control with a glycol unit that can be bought separately. It features adjustable legs, a rotating racking arm for beer transfers, a sample valve for easy testing during fermentation, an analog pressure gauge (0–30 PSI) for pressure monitoring and a 15-PSI pressure reducing valve for controlled fermentation. The smaller size features a 6-inch (15-cm) tri-clamp cap (larger models have an 8-inch/20-cm cap) as well as 1.5-inch (3.8-cm) tri-clamp racking port, and a 2-inch (5-cm) tri-clamp dump port, as well as numerous other ports to fit all of your needs. It also comes with a stainless blow-off assembly and drop-in ruler with volume markings. Sold separately is a compatible oxygen-free HopDrop for dry hopping, beer transfer kit, carbonation stone, and kits for Clean-In-Place and temperature control.

VISIT WEBSITE

BREWBUILT® X2 & X3 UNI CONICAL FERMENTERS

These fermenters made from 304 stainless steel feature mirror polish inside and out. The X2 is available in 7-gallons (26.5 L) for $770, while the X3 is available in four sizes from 7–38 gallons (26.5–144 L) with prices ranging from $1,210–$2,200. The X2 has a 2-inch (5-cm) bottom port and butterfly valve, and three horizontal ports on the cone for the racking arm, carb stone, and thermometer. It features a four-leg, reinforced base for maximum stability with adjustable feet, and has a 4-inch (10-cm) tri-clamp lid. Inside the tank are etched volume markings.

The X3 has a larger 8-inch (20-cm) tri-clamp lid and scaled-up 3-inch (7.5-cm) bottom port and butterfly valve with a tri-clamp Clear Flex Chamber Bottom Dump that allows you to see fermentation and remove trub, or harvest yeast. The X3 also includes more features such as a built-in external cooling jacket with 1.5-inch (3.8-cm) tri-clamp ports and a neoprene jacket for insulation. It includes the Pressure Pack lid with floating dip tube (available as an accessory in the X2), draft-style quick-disconnect connections for sampling/serving, and an extra 1.5-tri-clamp port for dry hopping. Both the X2 and X3 have a built-in 15-PSI pressure relief valve (though an optional pressure fermentation kit is required for pressurized fermentations).

VISIT WEBSITE

BREWHA BIAC®

The BIAC® (Brew In A Conical) is more than just a jacketed fermenter, it's an entire brewing system as well. It is the only system of its kind that allows you to mash, boil, and ferment in a single portable unit. The polished stainless steel BIAC® comes in 8-, 14-, and 20-gallon (30-, 54-, and 76-L) capacities ranging in price from $4,516.47–6,309.79. All are available in 240V electric, while the smallest size is also available in 120V. The system comes with a mash colander to hold the grain, pump, valves, fittings, and touchscreen temperature controller. The fermenter tank has a 14.9-PSI pressure rating (7 PSI in the jacket) to be used as a brite tank or serving vessel. It features three legs with casters, a pressure and vacuum safety relief valve, hop basket for dry hopping, and a water pressure regulator to limit the flow in the jacket when cooling. Sold separately is an accessory kit that includes Clean-In-Place assembly, flow meter, bottom valve upgrade, fermenter gas-in post, temperature control valve, mash mixer, and more. If preferred, the base unitank (minus the equipment to make it an all-in-one brewing system) can be bought separately in each size, ranging in price from $1,512.53–2,180.53.

VISIT WEBSITE

BREWTOOLS® F40 & F80 UNITANKS

The Norwegian Brewtools® F40 has a recommended volume of 5.2–10.5 gallons (20–40 L) and features a cooling jacket in the vertical walls and a neoprene insulation jacket. It is pressure-rated up to 30 PSI (15-PSI operating pressure) with an 8-inch (20-cm) tri-clamp port on top and 2-inch (5-cm) dump and racking valves. It has Brewtools' patented PureBlast™ 1.5-mm stainless steel surface inside and out that forgoes the need to passivate. It also has four adjustable legs, allowing it to stand from 33–41 inches (83–103 cm) in height. The unit includes a sample valve, pressure release valve, and numerous options for connecting accessories sold separately that include thermowells for sensors, carb stone kit, a sight glass, spunding valve, sample valve, HopDrop kit, and more. It retails for $1,999.

The F80 is the larger model with a capacity up to 19.8 gallons (75 L) and an adjustable height from 43–51 inches (110–130 cm). It retails for $2,199.

Brewtools also sells a "Light" version of each with the same tank body but slightly less equipment and some parts made from polyketone (POK). The F40 Light is $1,399 and the F80 Light is $1,599. Brewtools is distributed in North America by MoreBeer!

VISIT WEBSITE

CUSTOM FERMENTATIONS JF8 UNITANK

This fully customizable 8-gallon (30-L) unitank is made from 3-mm 304 stainless steel. Homebrewers may choose from popular pre-configured models or build a base tank from the ground up with the accessories that fit their needs and budget. It features a built-in cooling jacket and 100% sanitary tri-clamp connections. It advertises a 15-PSI working pressure (30-PSI max pressure) and includes a 5-mm neoprene insulation jacket. It has three legs and a 6-inch (15-cm) port at the top with an optional 6- to 3-inch (15- to 7.5-cm) reducer for large dry hop additions, Clean-In-Place system, or floating dip tube assembly. It features numerous 1.5-inch (3.8-cm) ports on the sides and cone for accessories and a 2-inch (5-cm) bottom dump port. The base tank (pictured on the left) is $899.99 or you can buy it with all of the accessories (on the right) for $1,619.99, or anywhere in between.

VISIT WEBSITE

DELTA BREWING SYSTEMS FERMTANK PRO SERIES

Available in three sizes with capacities of 8, 14, and 19 gallons (30, 53, and 72 L), the stainless steel Fermtank Pro series holds pressure up to 15 PSI. The lid contains two 1.5-inch (3.8-cm) tri-clamp ports and a 4-inch (10-cm) tri-clamp port. It has a 1.5-inch (3.8-cm) tri-clamp dump port and a 1.5-inch (3.8-cm) tri-clamp thermowell on the body with an included digital thermometer. Other 1.5-inch (3.8-cm) tri-clamp fittings are on the cone for accessories. Inside are etched volume markings. The unit comes with casters on its three legs for easy mobility and is brushed stainless steel to keep a clean look. Additional accessories sold separately include a 4-inch (10-cm) tri-clamp chilling coil, dry hopping kit, and more. Prices range in size from $590, $700, and $850. Note that only the Pro Series Fermtanks from Delta are pressure-rated.

VISIT WEBSITE

KEGLAND FERMZILLA ALL ROUNDER

This is the most basic and affordable pressurizable fermenter on our list. The egg-shaped PET body has a total volume of 7.9 gallons (30 L). The lid measures 4.75-inches (12-cm), allowing you to get your arm inside to easily clean it. It is pressure rated to 35 PSI, though you'll have to buy the FermZilla Pressure Kit to unlock the All Rounder's full potential and ferment under pressure (available in plastic or stainless, starting at $24.49). The plastic body is shatterproof and sits on a round stainless steel stand. It also comes with a stainless steel handle, adhesive thermometer, and graduation sticker for volume readings. The lid features molded drill locations if you choose to install addition accessories like a thermowell or cooling coil. The temperature rating is 131 °F (55 °C) when not under pressure, or a maximum temperature of 95 °F (35 °C) when holding pressure. Manufactured by Kegland in Australia and available from many North American homebrew suppliers for around $86.99.

VISIT WEBSITE

KEGLAND FERMZILLA TRI-CONICAL

Similar to the All Rounder, the Gen 3.2 FermZilla Tri-Conical is made from PET with a pressure rating of 35 PSI. It holds a total volume of 7.1 gallons (27 L). Where it builds on the All Rounder is the 3-inch (7.5-cm) butterfly valve at the bottom of its cone and 22-oz. (660-mL) collection jar to remove hop matter and yeast. You will need to add the FermZilla Pressure Kit for pressure fermentation. Another accessory sold separately is a tri-clamp pressure lid that adds a 2-inch (5-cm) tri-clamp port for adding dry hops or other additions without needing to remove the entire lid. Similar to the All Rounder, the Tri-Conical comes with a stainless steel handle, adhesive thermometer, and graduation sticker for volume readings. The temperature rating is 131 °F (55 °C) when not under pressure, or a maximum temperature of 95 °F (35 °C) when holding pressure. Manufactured by Kegland in Australia and available from many North American homebrew suppliers for around $175.99.

VISIT WEBSITE

KEGLAND KEGMENTER

Unlike many units on this list, the Kegmenter lacks the conical cone but the stainless steel fermenter makes up for it with its low price starting at around $274.99 for the 7.6-gallon (29-L) capacity option. Three additional sizes are also available, at 13.2, 15.3, and 31 gallons (50, 58, and 117 L) with the largest costing $499.99. The top of the keg is fitted with a 4-inch (10-cm) tri-clamp lid with ball-lock posts and a pressure relief valve. It features a floating dip tube and is rated up to 36 PSI with 1.8-mm stainless steel (the largest size is rated for 43.5 PSI). The posts are recessed to allow for stacking of up to four Kegmenters on top of each other. Because there is no drop valve to remove trub/yeast, it is recommended to have two Kegmenters so you can ferment in one and then transfer to another for carbonating and serving. Available accessories include a ball-lock jumper to easily transfer from one to another, as well as the Hop Bong Pressure Pack for oxygen-free dry hopping. Manufactured by Kegland in Australia and available from many North American homebrew suppliers.

VISIT WEBSITE

SPIKE BREWING CONICAL UNITANK

Spike offers four sizes for their homebrew unitanks with similar features: CF5 (7-gallon/26.5-L capacity), CF10 (14-gallon/53 L), CF15 (18-gallon/68-L), and CF30 (40-gallon/151-L). Each is made from 1.2-mm 304 stainless steel with a 15-PSI working pressure and polished finishes. The clamp and gasket lid includes a 4-inch (10-cm) tri-clamp modular top port as well as three 1.5-inch (3.8-cm) tri-clamp ports designed for a blow-off port, hop addition port, and a pressure relief valve. Spike's unitanks include a 2-inch (5-cm) dump port with butterfly valves and three 1.5-inch (3.8-cm) tri-clamp ports on the body. Sold separately are more than 20 accessories including a temperature control bundle, pressure relief valve, and other amenities. Base prices range from $660 for the smallest unit up to $1,725 for brewing batches up to a barrel in size in the largest homebrew size.

VISIT WEBSITE

Ss BREWTECH UNITANK 2.0

The new and improved Unitank 2.0 comes in four sizes for homebrewers: 7-, 14-, 17-, and 31-gallons (26.5-, 53-, 64-, and 117-L), each made from 1.5-mm 304 stainless steel. Each size has similar features including a laser-welded cylinder glycol jacket (plus a neoprene insulation jacket) and 15-PSI operating pressure. They feature a 3-inch (7.5-cm) tri-clamp top port and pressure relief valve. They also have 1.5-inch (3.8-cm) tri-clamp butterfly valves, carb stone, blow-off arm, pressure gauge, sampling valve, and thermowell. Also standard is a keyed rotatable silicone racking arm and adjustable feet. Available add-on accessories include a touch temperature control unit, heating pad, and more. Prices start at $1,099 for the smallest unit and go up to $1,999 for the one-barrel size.

VISIT WEBSITE

STOUT TANKS UNITANK FERMENTERS

Stout Tanks offers a 7-gallon (26.5-L) jacketed fermenter with a pressure rating of 15 PSI as well as a 20-gallon (76-L) jacketed fermenter that can be converted to a unitank with their Unitank Parts Kit, which gives it a pressure-rating up to 30 PSI (with a 15-PSI operating pressure). Both are made from mirror polished 304 stainless steel. The glycol cooling jacket extends all the way down into the cone for consistent temperature control inside. The lid features a 3-inch (7.5-cm) Clean-In-Place port and 1.5-inch (3.8-cm) pressure relief port (pressure relief valve sold separately). A sanitary thermowell is attached to a 1.5-inch (3.8-cm) tri-clover port and features two additional 1.5-inch (3.8-cm) butterfly valves. The price starts at $2,315 for the smaller unit and $2,711 for the 20-gallon (76-L) fermenter. Larger conical unitanks are also available.

VISIT WEBSITE

WILLIAMSWARN BREWKEG 12.5 & 25

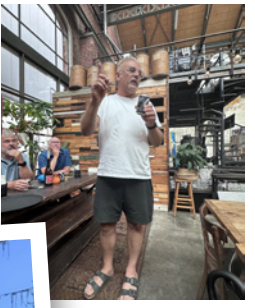
WilliamsWarn BrewKegs are stainless steel conical unitanks that come in two sizes ideal for homebrewers with maximum capacities of 3.3 gallons (12.5 L) and 6.6 gallons (25 L). The BrewKeg allows you to ferment and serve from the same vessel with gas-in and liquid-out ports at the top of the Corny-keg design. A large draining sediment bottle allows you to drain hop matter and yeast during the fermentation and clarification process without needing to remove the sediment bottle. The top features an adjustable pressure relief valve and the fermenter is rated at 40-PSI maximum pressure (25-PSI working pressure). The units do not include temperature control but will fit into standard-sized kegerators. WilliamsWarn is distributed in the U.S. through MoreBeer!, which sells the 12.5 for $494.99 and the 25 for $659.99. (BYO)

VISIT WEBSITE

BYO BELGIUM BREWERY ADVENTURE

Homebrewers experience the wide world of Belgian Brews

Brew Your Own readers including Publisher Brad Ring recently spent a week exploring the amazing diversity of beers in the Flanders region of Belgium. With visits to 13 breweries, the group was lucky to experience the incredible beer culture of Flanders firsthand in June during the BYO Belgium Brewery & Bicycle Adventure. We visited a broad spectrum of breweries from walking through a forest of foeders at Rodenbach where the group enjoyed samples straight from the huge oak vats to biking to Heilig Hart located in a former church with the brewhouse sitting among the stained glass windows on platforms suspended above the old alter space. All along the way we had the chance to meet with passionate local brewers happy to share their tips and techniques while the group enjoyed sampling their beers.



In addition to beer, bicycling is a big part of Belgium's cultural fabric. We connected with both these Belgian loves by pedaling through cities and scenic farmlands on their impressive bike route network and free bike ferries across rivers — always with each bike ride ending at a brewery! It was a wonderful way to connect with the local rhythms while earning that next chalice of wonderful Belgian beer.

From quadrupels to lambics, it was a special chance to enjoy classic Belgian beer styles at the source. It doesn't get much better than enjoying a bottle of Westvleteren 12 sitting across the street from the Trappist abbey where it was brewed or peeking in at Cantillon's famous coolship in their Brussels attic before heading through their aging barrels to sample their world-class lambics and gueuzes.

Our week was filled with very special experiences with local brewers even opening their homes for us; such as at Leroy Breweries where we sat in a living room for a tasting from two historic Belgian beer families pouring samples of their well-known Hommelbier and Duchesse de Bourgogne. Or the fun of spending two nights sleeping in the country inn run by St. Bernardus, fully stocked with their great beers in the shadow of the brewery and their hop-yard. Speaking of hops, we also enjoyed a tour and visit with the small family hop farm of t' Hoppecruyt, learning more about their operation and the Belgian hop industry.

Plus all that beer had plenty of great Belgian food often featuring beer as one of the cooking ingredients — and of course world-class frites served with most dishes. We had beer-soaked stews and mussels making sure to leave room for ice cream also made with beer. The group enjoyed a four-course beer-paired dinner at a Michelin-starred restaurant and even traveled across the border to France for dinner at a wonderful beer-centric country tavern.

From the scenic medieval cobblestone streets and canals of Bruges and Ghent to the rolling Flemish farmlands dotted with dairy cows, hop trellises, and World War I cemeteries, the group had a great taste of both urban and rural settings for breweries all combining for the unique chance to experience Belgian beer culture up close one sip at a time.

Our upcoming *BYO* trips to South Africa, New Zealand, and the Netherlands & Germany are all sold out, but we hope you can join us on a future brewery adventure. Details on trips can be found at byo.com/trip. *Proost!* BYO

DIP HOPPING vs. COOLPOOLING

A homebrewer's exploration into hop expression

by Drew Jackson

There have been so many ways developed to impart different hop notes in beer. Two of the ways I have explored recently are dip hopping and coolpooling. They are similar in that neither method isomerizes hop alpha acids. Without isomerization, the hops do not impart bittering but can add a great deal of flavor and aroma.

In this article I will break down how the two processes work, how they are similar and how they are different, and the impacts I have seen from both. My hope is you will be curious enough about the two techniques to try them in your brewing. The reward for those who do will be unique hop expression and increased aroma in your homebrews.

In 2021, when I first learned about dip hopping from an article in *Brew Your Own*, I was immediately interested in exploring what it had to offer a homebrewer like myself. A newer process that can increase aromatics and open up flavors in hops not normally tasted? How could I not look into it?

I immediately started a discussion with my brewing partner about the process and in a short time we had our first beers in production using dip hopping techniques. We did a parallel brew of a double IPA and were very impressed with the results. The bittering seemed "softer," and the hop profiles and aromatics were much more pronounced. We continued our own experiments to make five beers that were dip hopped. This experimentation led to the best double IPAs either of us had ever made. In the last four years I have used this process in over 20 different brews. It's offered me a way to easily pasteurize the strange herbs and addends I use as a farmhouse brewer while at the same time releasing flavors that I had never encountered before.

THE SCIENCE BEHIND DIP HOPPING

Dip hopping is a method that helps accentuate pleasant hop aromas while suppressing off-flavors. First developed by brewers at the Kirin Brewery in Japan in 2012, dip hopping involves removing a portion of the wort early in the boil, cooling it, and adding hops to it in a sealed fermenter before fermentation starts. Kirin kept the results of their study very close to the vest for quite some time but revealed some of their results at a brewers' conference in 2018. The variables they experimented with were temperature, volume of liquid, amounts and types of hop products added, and time of contact.

This technique is believed to produce a few notable effects. The main one is the volatilization of myrcene (β-myrcene), a hop monoterpene that can contribute harsh flavors to beer. Myrcene is a naturally occurring compound found in various plants like hops and cannabis and is known for its grassy, earthy, and sometimes musky aroma. It is one of the key components of hop aroma so it might seem counterintuitive to reduce this hydrocarbon. But by suppressing this component in the liquid and holding it in the wort as a gas, other much more pleasant aroma components are brought to the forefront. Some brewers have reported amplified linalool and geraniol through reduction of myrcene in their own experiments.

One of the most exciting discoveries for me has been the unlocking of new flavors from familiar varieties of hops. Azacca® and Enigma® are two hop varieties that typically offer spicy notes. The flavor notes in my own trials were significantly changed in these two varieties of hops through the dip-hop process. Other hops that will benefit from this process are the hop varieties already rich in geraniol or linalool.

POPULAR GERANIOL-RICH HOP VARIETIES:

Cascade
Mosaic®
Citra®
Bravo
Amarillo®
Comet
Pacific Hallertau
Southern Cross
Centennial
Chinook
Motueka™
Styrian Golding (Celeia)

POPULAR LINALOOL-RICH HOP VARIETIES:

Amarillo®
Cascade
Columbus
Centennial
Mt. Hood
Nugget
Pacifica™
Willamette
Cluster

The dip-hop process can also suppress the production of 2-Mercapto-3-methyl-1-butanol (2M3MB), an off-flavor that can make beer taste onion-like. The suppression of this compound is partly due to lower hydrogen sulfide content in the beer, which is typically associated with the development of off-flavors. There are other things brewers do to reduce the formation of this chemical like controlling oxygen levels during wort preparation, but dip hopping really seems to do the job.

MY EXPERIENCE WITH DIP HOPPING

I have always used boiled wort for my dip-hop additions and have experimented extensively with a contact time of 20–30 minutes with good results. The variables I've played with are choice of hops, quantity and types of additions, volume of liquid for steeping, and time in contact. Brewing 5-gallon (19-L) batches, I typically dip hop using 1–2 gallons (4–8 L) of wort (enough to cover the addition with liquid). Keep in mind, pellet hops will absorb liquid and solidify, so be sure to add enough wort to overcome this absorption. I finish the boil and transfer wort at 180 °F (82 °C). At this temperature I am effectively pasteurizing anything that is added to the beer while staying below the temperature where isomerization of the hops occurs. With my system, the dip-hop addition will free fall in temperature to about 150 °F (66 °C) while the remaining wort is cooling. Myrcene volatilizes at 150 °F (66 °C) so this temperature drop works throughout the steeping time. In my studies I have put an airlock on the fermenter to see how long the off-gassing continues, but I now seal the fermenter to hold as much in the way of aromatic compounds as possible in the wort.

I bag what is added to the fermenter, and pull it out prior to transferring the larger volume of cooled wort. I have been successful top cropping yeast if the dip-hop addition is small, (2 oz./56 g or less). But be prepared to lose the ability to harvest yeast if you decide to dip hop. I calculate the IBUs by considering the dip hop as a whirlpool addition. The dip-hop bitterness is softer — very much like a mash-hop addition. This is ideal for hazy IPAs and some less bitter styles, though at times, this soft bitterness has proven to be a bit too soft for my palate and I have adjusted some of my West Coast IPA recipes for a sharper hop note.

COOLPOOLING

When I started seeing the positive results of dip hopping firsthand, I could not for the life of me understand why more commercial brewers were not doing it. Shortly after starting my journey with dip hopping, Lagunitas made a beer called, "Dip Trip, Free Ride IPA." In promotional material accompanying the beer at the time, it stated: "The wizard brewers of Lagunitas invented a brand-spankin'-new style of IPA just for IPA Day." The "brand new" part, which is up for debate, was free rise (no temperature control and dip hopping). After this beer, I heard very little about commercial brewers using the process, but I did hear and see mentions of "coolpooling" from quite a few pro breweries.

Coolpooling is adding hops to cooled wort. Sometimes this addition is in the brew kettle, and other times it is in a secondary vessel. Many commercial brewers do it at 170–180 °F (77–82 °C), but some are known to do it at much cooler temperatures. Some brewers do it in place of whirlpooling in recipes (which consists of adding hops at flameout), and others do both; but either way the goal seems to be the same: Add full hop flavor and aroma without adding bittering.

"We do tend to get better fruit character from the hops with what I'd call a more refined aroma and flavor (through coolpooling)," explains Vinnie Cilurzo, of Russian River Brewing Co. "Bitterness is also lower due to less isomerization, so that needs to be taken into account."

To learn more about the process of coolpooling, I asked some of the brewers doing it to share how they coolpool with me:

"We get down to about 180–185 °F (82–85 °C) using approximately 10% filtered room temperature water. One of the biggest keys to coolpooling is what temperature water you use. Some brewers will use cold liquor water, which allows you to get a cooler wort by using less diluting water to get to 180–185 °F (82–85 °C). We are careful to not go below 180 °F (82 °C) as this is the temperature known to keep things sterile."

– Vinnie Cilurzo
Russian River Brewing

"We don't add any hops until the coolpool. When we finish our boil (we shorten this to 60 minutes vs. 90 for most of our beers), we run the wort through our counterflow heat exchanger until it reaches 170 °F (77 °C). Then we add a heavy hop addition. We double the contact time we normally use (30 minutes vs. 15 minutes).

– J. Shilling
Dirt Road Brewing

"I use that technique on a select few of my beers. I pre-chill the entire batch and generally take it to 180–190 °F (82–88 °C) depending on what I am trying to achieve. We begin our 30-minute wort chill about 20 minutes after the whirl-

pool is complete."

– John Kimmich
The Alchemist

"I personally haven't found a big difference in the hop aromatics; we just use whirlpool temperature as a tool for controlling bitterness. Originally, we whirlpool in the kettle, so we'd recirculate through the heat exchanger and back into the kettle to get to the target temperature. Then we'd bypass the heat exchanger and pump for 20 minutes with the hops in there. Then settle for 20 minutes, then run off for ~30 minutes depending on how quickly we could knockout. We now have a dedicated whirlpool, so we go through a shell and tube heat exchanger onto the hops. Now it's just the momentum of the transfer that keeps it spinning. Closer to 10 minutes going in, 20-minute rest, 30-minute knockout."

– Michael Tonsmeire
Sapwood Cellars

WHIRLPOOLING VS. COOLPOOLING

Whirlpooling hot wort after boiling is used to remove hop material added during the boil. Because the wort is hot enough to isomerize alpha acids, heavy late additions of hops add significant bitterness. When coolpooling, the wort temperature is reduced before the last hot-side hop addition so hop aroma is extracted but alpha acids are not isomerized. Some brewers cool their wort by adding cold water to the kettle and others slightly cool their wort with a wort chiller. With a quicker wort cooling process in coolpooling, brewers are able to preserve terpene compounds and more of the delicate hop flavors and aromas in this hop addition. Rapid cooling also helps prevent the formation of dimethyl sulfide (DMS), a compound that can impart a "cooked vegetable" flavor to beer. In addition to these benefits, the process also aids in settling solids (trub) in the kettle, leading to a clearer beer to transfer out of the fermenter.

With recent products such as Abstrax® terpene extracts hitting the market, we have more ways to add terpenes to beer later in the process, but if a brewer could avoid the additional expense of these additives, why not? These products still seem like a good thing to have in the brewer's toolbox to really "dial in" the desired hop flavor profile, but getting a head start helps and many brewers use both to really pack an aromatic punch.

HOW IS DIP HOPPING DIFFERENT THAN COOLPOOLING?

I have found between these two processes that dip hopping suppresses off-flavors while opening up the possibility of accessing new flavors, while coolpooling maintains and enhances more subtle flavors already present in the wort. The big difference in these techniques is that hop solids are removed from wort when coolpooling — as the wort is transferred after a period of coolpooling, leaving the majority behind. Because hop solids remain in the wort/beer when dip hopping, more nucleation sites are added to the fermenting beer. This is why Kirin believes that dip hopping suppresses less desirable "grassy" characteristics of myrcene. Another difference is dip hopping requires sealing the fermenter, ideally preserving more of the aroma compounds.

For commercial brewers, dip hopping can be problematic — which is likely why is isn't utilized more on the larger scale. Either their systems are not set up to transfer wort to a separate vessel or they lose the ability to harvest yeast due to it, which can be a significant cost factor. Coolpooling seems to be much more easily done on a commercial system. Both methods amplify hop taste and aroma while minimizing bitterness additions, but the science and processes to achieve these results seem very different. Coolpooling is a gentler method for drawing out hop character while preserving subtler flavors that could be overwhelmed by more aggressive methods.

For brewers looking for a harmonious beer, blending the two could help create something more complex with many layers of hop expression, including more subtle flavors that you may have never tasted before. Dip hopping could give that fresh hop hit, while coolpooling could round out the flavors and help integrate them into a more cohesive whole. This approach would definitely require careful consideration of timing and amounts to ensure that the combination isn't overwhelming, but it's certainly an interesting avenue to explore.

I see these two processes this way: Dip hopping offers access to new flavors/aromas. Coolpooling gives the brewer a tool to access more subtle flavors/aromas while rounding them out.

MY EXPERIENCE WITH COOLPOOLING

In the last few years, I have become focused on the idea of balance in my beers. With IPAs and double IPAs I work with the bitterness units-to-gravity units (BU/GU) ratio as a starting point when designing recipes. A commercial brewer told

Photo by Vito Delucchi

Coolpooling contributes significant aroma and flavor, but little bitterness from the hops as less isomerization occurs at temperatures below 180 °F (82 °C).

me he looks at balance using a simple formula of 8–10 IBUs per percentage of alcohol in his finished IPAs. This formula is a quick and easy way to look at the hop balance in my beers, but there is a mathematic formula available to calculate it more precisely. This works with the addition of a "perceived bittering" calculation in addition to the somewhat simpler BU/GU formula. This perceived ratio takes into account the finishing gravity of the beer; sweeter beers do not manifest as bitter on the palate as drier beers do. Neither of these calculators take into account that bittering could be added to the beer with ingredients other than hops, nor do they account for bitterness from hop compounds other than iso-alpha acids.

Since I started looking at this balance ratio, the IBUs in my beers have consistently come down. Some of it is due to a change in my palate, but much of it has to do with the different late-addition processes I now use adding hops to beers. For my test beer I decided to shoot for the low end of the IBU range and see if coolpooling really enhanced the hop expression of flavors and aromatics.

I would commonly design a double IPA recipe like the one to the right with 80 IBUs. However, the Coolpooled IPA calculates to 58, (this results in a BU/GU of 0.725). The IBU range for DIPAs according to the Beer Judge Certification Program (BJCP) is 60–120, so looking at their scale I am at the low end of the range. The final gravity of this beer also did not finish as low as expected, with fermentation stopping at 1.018, which means that it is sweeter than I normally get. I usually hit 1.012–1.014 FG on these styles. If I would have hit these finishing numbers, I would have had an even greater hop punch. I'll add my reflections on the results following the recipe.

Related Link:

• *Learn more about dip hopping in this video by* BYO*'s Technical Editor Ashton Lewis at :*
www.byo.com/video/dip-hopping

COOLPOOLED DIPA RECIPE

(5 gallons/19 L, all-grain)
OG = 1.081 FG = 1.018
IBU = 58 SRM = 7 ABV = 8.3%

INGREDIENTS

13 lbs. (5.9 kg) pale 2-row malt
3 lbs. (1.4 kg) white wheat malt
8 oz. (230 g) dextrin malt
13 AAU Centennial hops (15 min.) (1.25 oz./35 g at 10% alpha acids)
20 AAU CTZ hops (15 min.) (1.25 oz./35 g at 16% alpha acids)
0.75 oz. (21 g) Centennial hops (coolpool)
0.75 oz. (21 g) Chinook Cryo Hops® (coolpool)
2 oz. (56 g) Mosaic® hops (dry hop)
Yeast nutrient (15 min.)
Whirlfloc (15 min.)
Omega Yeast OYL-071 (Lutra Kveik) or your favorite neutral yeast such as Wyeast 1056 (American Ale) or SafAle US-05

STEP BY STEP

This recipe uses a "Light Hoppy" water profile. Mash in all of the grains at 150 °F (66 °C) with 6 gallons (23 L) of water. After 45 minutes, batch sparge with 5.5 gallons (21 L) of water at 170 °F (77 °C). With my system I ended up with 7.5 gallons (28 L) in the boil. My evaporation rate is 10% per hour. You should adjust the sparge amount based on your evaporation rate — shoot for 7.5–8 gallons (28–30 L) in the boil for a 5-gallon (19-L) batch.

This is a 90-minute boil. Begin boil and after 75 minutes add the 15-minute hop additions. At the end of boil, rest for 15 minutes. Add 10% cold water (about 3 quarts/L), then cool to 180 °F (82 °C) with your chiller. I used the coolpool process described by Vinnie Cilurzo at Russian River Brewing. When the target coolpool temperature of 180 °F (82 °C) is reached, add the coolpool hop additions and hold this temperature for 20 minutes.

After the coolpool, continue chilling the wort to yeast-pitching temperature (I fermented with kveik at 80 °F/27 °C, but other yeast will be cooler). When fermentation is complete, package as usual.

Extract version: Substitute the pale and wheat malts with 7 lbs. (3.2 kg) light dried malt extract and 1.5 lbs. (0.7 kg) wheat dried malt extract. Bag the dextrin malt and add it to 6 gallons (23 L) of water as you slowly bring it up to 170 °F (77 °C) and rest there 10 minutes. Remove grains and bring to a boil. Turn off heat and stir in malt extracts, being careful not to scorch any on the bottom of the kettle. Once dissolved, return to heat and follow the remainder of the all-grain recipe.

REFLECTIONS:

The bittering notes were more subdued than I would like due to the low attenuation, but the flavors and aromatics were definitely enhanced from coolpooling. There is also a fruitier tone to the hop build, which I am pretty sure did not come from increased ester production of the yeast. (Lutra is very neutral at lower fermentation temperatures.) After having the beer in the keg for a month, I found that the aromatics maintained their punch and the increased hop expression held up. The only tools I have used in my brewing that offered a similar long-term benefit were thiol-enhancing yeasts and processes.

Since I can cool 5-7 gallons (19–26.5 L) of beer with a 50-foot (15-m) stainless immersion chiller rather quickly, I am not really sure this technique is as effective for my small system as it might be with a larger volume, but if it offers subtle flavors that would not normally be perceived it is a winning technique that is worth exploring. BYO

BY DREW BEECHUM & DENNY CONN

TESTING NEW MALTS

Passing your grain exam

Despite this being the age of the hop, maltsters are bound and determined to not let the lupulin farmers have all the fun. We're nearly buried under mountains of new grains and varieties that promise something special. To confidently choose from this giant pile of ingredients, we've preached practical experience for best results and insights into what a new toy gives our brews.

But even the most ambitious amongst us will discover that keeping pace with the deluge is akin to King Canute commanding the tide. Surely there must be an easier way to gain the malty knowledge we need!

Would you be surprised if we said, "Why, yes . . . yes there is!" After all, this would be an awfully short monograph if we didn't! Before we dive headlong into processes and procedures, let's discover why we need to develop our grain "vibing" skills.

WHAT'S NEW IN GRAIN

The Old

With rare exception (looking at you, Maris Otter), barley varieties constantly change. Just like every big bright red summer tomato isn't a "Beefsteak," your "pale malt" might be made of varieties like Conrad, Expedition, Odyssey, and more. The American Malting Barley Association releases an annual list with recommended varieties. The 2024 edition contained more than 40 recommended barley crops.

This explains why you'll see older grain bills that list "Klages" or "Harrington" – two popular varieties introduced in the '70s and '80s. But as growers' needs change (yield, disease-resistance, drought- and temperature-tolerances, etc.), they plant new varieties to meet customer demand.

"Flavor" is not in that list because in modern agronomics, a matter of taste rarely matters. This change makes recreating historical recipes a dicey proposition since you can't start with the same grains . . . until recently. Several maltsters — Crisp and Weyermann among the largest — have planted select heritage crops bringing back old varieties with different flavor impacts at a premium price.

Craft maltsters like Sugar Creek are in the game releasing Edelweiss, an old Pilsner malt. It's a trip to make an IPA with "the original IPA malt" (Crisp Chevallier®), but given their dearness, you want to use them to their utmost.

The New

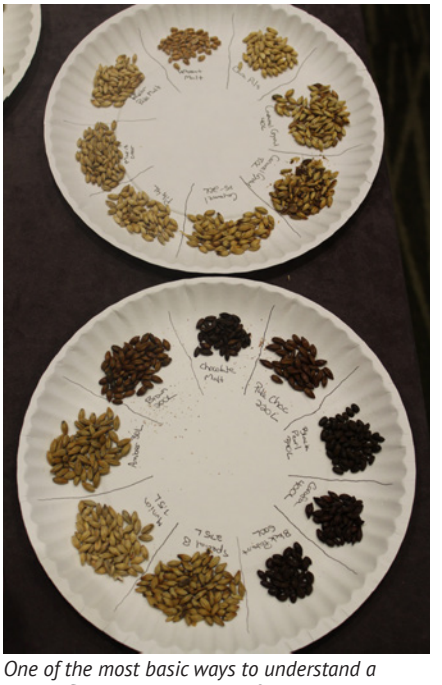
Naturally, not all of the grainy goodness is looking to the past. New malts and malt types are being released all the time. Like the recent rise of "red" malts hitting the market to simplify making bold red beers without the color variability or hint of roasted coffee added by the traditional skosh of black malt. Different forms of crystal malts with new flavor profiles. Even new base malts designed for modern needs (see Gambrinus IPA Malt or lager malts with softer levels of classic Moravian malt flavors). And new adjuncts galore like malted corn or variants of malted oats or even wilder grains new to the brew kettle.

Plus, the craft malt scene adds layers of terroir and differing technique to the mix! With so many new options out there, it's time to try something different.

TAKING THE MALT CHALLENGE (FROM EASIEST TO HARDEST)

How do you make a beer with a new malt without wasting your time or your beer? After all, we only get so many brew days and we want to maximize their utility. We'll give you a few quick and easy methods, one medium effort bit of nerdery, and then finally walk through the one true way to know.

What do you taste? As with all things sensory – tie it back to images and sensations you know.



One of the most basic ways to understand a grain's flavor is to chew on a few kernels and let them sit on your tongue for 30 seconds.

HIT THE BOOKS

We are card carrying nerds of the type with fond memories of hours spent riffling the card index searching for information. Today, it's so easy to grab data that we neglect to think of it as a real effort. But in this case, it absolutely is where you start. Malt companies want you to use their products and they know it's a confusing landscape. On their websites you'll find the base numbers (gravity, color, protein, etc.) and descriptions you need to form a basic opinion. If you're visually oriented, look for spider graphs that chart tasters' perceptions.

Some websites will also list things like suggested uses — styles and amounts — but don't feel constrained by them. One of us (guess which) kinda purposefully pivots away from suggestions out of sheer stubbornness. "Oh, this is the original IPA malt? How about I make a mild with it?" (Incidentally, that was a great mild.)

If the info you need isn't handy, reach out to the maltster directly with your questions.

The truth is also out there buried in the opinions of your fellow brewers and if you know anything about brewers, they love to talk beer. Find a commercial brewer that makes a beer with the target grain. Ask online forums, phone a friend, etc. This is a good starting point, but you're brewing for your preferences, so at some point you're going to need to put the grain where your mouth is.

TASTING

After reading and researching you should have an inkling of an idea or a plan, but words are not organoleptic reality, plus you may randomly discover a grain when you walk into your local brew shop (remember those?). The great search engine in your pocket may get you started but the first way to suss out a malt's character is thankfully the easiest and a test you should be doing on the regular anyways. Taste them!

A good homebrew store allows you to grab grain from bulk bins and buckets. Ask if they mind you sampling a few grains here and there. We've yet to encounter a shop that begrudges curious nibbles. This is not an all you can eat cereal bar — your intention is discovery, not gluttony. Grab four or five kernels and give them the once over — physically, visually, and aromatically. What does the grain feel like? Is it hard, soft, or glassy like a crystal malt? Is the color uniform across the sample? Is it possibly a blend of grains? What do you smell? Spices, earth, dust, or must? Does it smell of fresh bread dough or toast?

Steeping grains to make a grain tea and running it through a coffee filter is a great way to taste new malts.

Then commit to violence — pop the kernels into your mouth and crush them open. DON'T SWALLOW. Let the partially powdered grain sit on your tongue, soaking in saliva. As you wait 30 seconds or so, you'll feel a shift. The malt transforms in your mouth via the amylase enzymes in the saliva. Starches get transmuted into sugars and flavors open up.

What do you taste? As with all things sensory – tie it back to images and sensations you know. It's OK to think things like "Cocoa Puffs," "Maris Otter, but more so," or "Burnt toast and Munich malt." These images/phrases form the functional foundation of what you need to effectively use these new ingredients. Tying new ingredients to items you already use helps guide you. This test also refreshes your sense memory for ingredients you already know.

If you're ambitious, try a proportional test. Grab 20 kernels of grain in a mix that reflects how you'd use them in a beer — say, 18 pale malt and two of the new stuff (a 90/10 split) and repeat the test. What do you perceive this time?

Fill out the mental index card and file it in the stacks for future use.

GRAIN TEA

Eating the grain is a good way to get your start, but at some point, it's just not complete enough. If you have multiple malts to compare, then it's also not terribly efficient. Fortunately, Briess has given us a fairly easy method to test called the hot steep method — aka grain tea!

While hot barley tea is a thing in a number of countries, it's not here — except with brewers mixing wort with Scotch (aka the Hot Scotchy) as a cheeky breakfast beverage. In 2015 Briess teamed up with Lindsay Barr, now of Draught Lab, to create a standardized method of creating malt teas for sensory evaluation.

Since this is also an American Society of Brewing Chemists (ASBC) test (ASBC Sensory Analysis 14 Hot Steep Malt Sensory Evaluation), the method is rigidly proscribed. What it boils down to is pretty simple though:

- Take 52 g of malt (either 100% base malt, 50/50 of base and specialty, or 85/15 of base and dark roasts) and blend it into powder, husk and all.
- Mix 50 g of the grain dust with 400 mL of water at 149 °F (65 °C) in a jug.
- Steep for 15 minutes.
- Run the steeped liquids after 15 minutes through a fine paper filter (such as a coffee filter).
- Once collected, allow to cool to room temperature and sample. Take copious notes of the aroma, flavor, and color sensations.

In other words – create a very small mash, convert the starch, strain the wort, taste.

That's a very quick summary, but full instructions can be found on Briess's website here. But remember the reason these tests have precise instructions is to ensure that the sensory lab produces reliable results with repeatable methodology. In other words, it's not the only way to steep a cereal. For home use, create your own method with what you have on hand. As long as you can "mash, convert, strain" on a small scale with consistent measures. Go for it! Drew's been known to hold jars of mini mashes warm in a sous vide bath, because he's obsessed with foodie hot tubs.

Making malt tea is more time consuming than chomping on a few kernels, but it's still straightforward, cheap, and effective for exposing the impact of a grain. And yet . . .

BREW IT REAL GOOD

Ultimately, the one true path to ingredient wisdom is to brew. You have a few paths laid out before you – the "purely scientific route," the "tweener route," or the "we're doing it live" route.

The scientific route looks a lot like the Briess hot steep method, but completing the brew day. Make a simple recipe with basic base malt and your target malt. We used our Magnum Blonde Ale (recipe to the right) for testing a number of hypotheses and what's "the impact of this grain" if not a testable question? Mid-weight gravity, moderate neutral bittering, with neutral fermentation characters. To test specialty grains, sub in a portion of the attached recipe's bill for your new grain. Say 10% for an assertive malt and up to 50% for less assertive grains.

Trust us when we say this beer is almost aggressively neutral and therefore perfect for accentuating any changes to ingredients or process. If you want to truly go full science nerd, brew a control batch with no adulterations to serve as a clear baseline. Differences will stand out like a candle lit in a darkened room.

For the in-between route, and honestly the approach we take most often, take a recipe you know intimately, the kind that is settled in your bones, and add the new grain in there. The hope is to be able to discern the impact of the new grain you're trying out but also brewing a beer that is a good fit for that grain and will result in a beer you'll be happy to consume an entire batch of (over the course of time). Drew's been doing this for yeast and grains for years with his Saison Experimentale and his Cream Ale. Denny makes tweaks to Wry Smile Rye IPA or others. It's not the most scientific, but it's useful as a bench trial of a real application to our brewing world. Just choose a recipe where the kind of grain you want to learn about is relevant.

Lastly, there's the classic homebrewer method — flying by the seat of our inflammable pants. You could totally wing a new recipe. After all, why not? It's only beer. But even when you're testing the drag coefficient of your trousers, try and keep an eye towards the learning. How will you pick out what this one "new to you" ingredient does? Are you showcasing it? If it's blended in with other new/forceful ingredients, you're going to have a devil of a time picking out each addition's impact. But this is homebrewing, if you're not having fun by forcing yourself into a final exam reminisce, what's the point? Fly that daredevil spirit, you just might have to repeat your lessons like a recalcitrant pupil. Wait, more beer? Hmm . . . maybe we should do more "experiments" like that.

Two last thoughts before we leave you to your grain explorations. Don't be afraid to brew small — your learnings are just as valid whether you're making one gallon (3.8 L) or a hundred (380 L). Lastly, don't get overly exuberant with your new toys. Using too much of an ingredient can blur the knowledge you want for day-to-day brewing.

Now go and find your new favorite ingredient!

Related Link:

• *Earlier this year we profiled more than a dozen new malts and adjuncts made available to homebrewers in recent years. Revisit the list to find something new to brew with at:* **www.byo.com/article/new-malts-to-brew-with**

MAGNUM BLONDE ALE

(5 gallons/19 L, all-grain)
OG = 1.047 FG = 1.010
IBU = 45 SRM = 3.4 ABV = 4.8%

This recipe makes an extremely neutral blonde ale and is a great base recipe for experimenting with new ingredients. Replace a reasonable amount of the base malt with another base or specialty malt at a one-to-one ratio.

INGREDIENTS

9.7 lbs. (4.4 kg) North American 2-row pale malt
8 AAU Magnum hops (60 min.)
(0.7 oz./20 g at 11% alpha acids)
8 AAU Magnum hops (20 min.)
(0.7 oz./20 g at 11% alpha acids)
Wyeast 1056 (American Ale), WLP001 (California Ale), SafAle US-05, or LalBrew BRY-97 yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Use the Bru'n Water "Balanced Yellow Water Profile." Mash your grain at 152 °F (67 °C) for 60 minutes. Mash out and collect about 6 gallons (23 L) of wort. Boil 60 minutes, adding hops as indicated. Cool, pitch yeast, ferment, and package.

Extract option: Replace the 2-row pale malt with 5.25 lbs. (2.4 kg) light dried malt extract or 6.5 lbs. (2.9 kg) light liquid malt extract. Heat 6 gallons (23 L) of water in your kettle, steeping any specialty grains you would like to trial. At 170 °F (77 °C), remove the grains and bring to a boil. Following the remainder of the all-grain recipe. You do not need to reduce the extract when steeping specialty grains.

HOMEBREW DIRECTORY

UNITED STATES

CALIFORNIA

THE CHI COMPANY
6070 Enterprise Dr., Suite K
Diamond Springs 95619
(530) 622-8265
info@chicompany.net
www.chicompany.net
4000+ Beverage related parts: Beer, Wine, Soda. New & used equipment. Brass & Stainless Fittings. ALL Ball, Pin & Sanke keg parts. If we don't have it — We will find it for you!

MOREBEER! & MOREWINE! (Concord)
995 Detroit Ave. Unit G
Concord 94518
(925) 771-7107 fax: (925) 671-4978
srconcord@moreflavor.com
www.morebeer.com
Absolutely Everything! for Beer-Making

MOREBEER! & MOREWINE! (Riverside)
1506 Columbia Ave. #12
Riverside 92507
(951) 779-9971 fax: (951) 779-9972
srriverside@moreflavor.com
www.morebeer.com
Absolutely Everything! for Beer-Making

NORCAL BREWING SOLUTIONS
8865 Airport Rd., Ste. H
Redding 96002
(530) 243-BEER (2337) or
(530) 221-WINE (9463)
www.norcalbrewingsolutions.com
Beer, wine & distilling supplies, hardware, and "Jaybird" custom fabricated equipment including stills, Speidel accessories, and yeast harvesters.

SOCAL BREWING SUPPLY
747 Shadowridge Drive
Vista 92083
(760) 420-3774
socalbrewingsupply@gmail.com
www.socalbrewingsupply.com
SoCal Brewing Supply features a huge selection of brewing ingredients to support all your homebrewing needs.

STEIN FILLERS
4160 Norse Way
Long Beach 90808 (562) 425-0588
www.steinfillers.com
brew@steinfillers.com
Your complete Homebrew Store, serving the community since 1994. Home of the Long Beach Homebrewers.

COLORADO

BOULDER FERMENTATION SUPPLY
2510 47th - Unit 1
Boulder 80301 (303) 578-0041
www.boulderfermentationsupply.com
Newly Expanded! Proud vendor of Colorado Malting Co. With a wide range of gluten free grains, CO_2 refills and all your fermentation needs. Stop in, open weekdays 11-7, weekends 10-6.

LIL' OLE' WINEMAKER
516 Main Street
Grand Junction 81501
(970) 242-3754
Serving Colorado & Utah brewers since 1978

ILLINOIS

GNOME BREW
2026 W Montrose Ave.
Chicago 60618 (773) 961-7750
gnomes@gnomebrewshop.com
gnomebrewshop.com
2022 Homebrew Shop of the Year. Easy online ordering with next day fulfillment and nation-wide shipping. Call or email us anytime to talk with our knowledgeable and friendly staff.

IOWA

BLUFF STREET BREW HAUS
372 Bluff Street
Dubuque (563) 582-5420
jerry@bluffbrewhaus.com
www.bluffbrewhaus.com
Complete line of wine & beermaking supplies. In operation since 2006.

KANSAS

BACCHUS & BARLEYCORN LTD.
6633 Nieman Road
Shawnee 66203 (913) 962-2501
www.bacchus-barleycorn.com
Fast, friendly, personalized service since 1968. Full line of fresh ingredients for home beer, wine, mead, cider and cheese makers. Your home fermentation specialists.

LOUISIANA

BREWSTOCK HOMEBREW SUPPLY
1300 S Broad Ave.
New Orleans 70125 (504) 208-2788
www.brewstock.com
email: oliver@brewstock.com
Louisiana's largest selection of Homebrewing supplies! Beer, wine, cider, distilling, kombucha, and more!

MARYLAND

THE FLYING BARREL
1781 North Market St.
Frederick
(301) 663-4491 fax: (301) 663-6195
www.flyingbarrel.com
Maryland's original Brew-On-Premise; winemaking and homebrewing supplies!

MICHIGAN

BELL'S GENERAL STORE
355 E. Kalamazoo Ave.
Kalamazoo 49007 (269) 382-5712
www.bellsbeer.com
Staying true to our roots, Bell's General Store has been supplying homebrewers since 1983. Visit us next door to Bell's Eccentric Café or online at www.bellsbeer.com

SICILIANO'S MARKET
2840 Lake Michigan Dr. N.W.
Grand Rapids 49504
(616) 453-9674 fax: (616) 453-9687
e-mail: sici@sbcglobal.net
www.sicilianosmkt.com
The largest selection of beer and wine making supplies in west Michigan. Now selling beer & wine making supplies online.

MINNESOTA

MINNESOTA HOMEBREW
22043 Industrial Blvd., Ste. 2
Rogers 55374
(763) 742-9035
www.mnhomebrew.com
Minnesota Homebrew is a brewing and canning supply store offering a wide selection of products related to all things brewing, fermented, and preserved, while maintaining a friendly and informational environment.

NEW HAMPSHIRE

EARTH EAGLE BREWINGS
350 NH-108
Somersworth 03878 (603) 767-8235
www.aghomebrewsupply.com
alex@eartheaglebrewings.com
Fromerly A&G Homebrew Supply
Quality supplies for beer and winemaking at home. CO_2 exchanges, kegging equipment. Cheesemaking, gifts, books. Friendly, expert service and great prices. Plus, Earth Eagle Brewings merch and 4-packs!

NEW YORK

PANTANO'S WINE GRAPES & HOME BREW SHOP
249 Rte 32 South
New Paltz 12561
(845) 255-5201 or
(845) 706-5152 (cell)
www.Pantanosbeerwine.com
pantanowineandbeer@yahoo.com
Find Us On Facebook. Full line of homebrewing equipment & ingredients for all your brewing needs and Distilling Yeast. Serving Hudson Valley's homebrewers. Beer Club in House! M.H.B.A.

NORTH CAROLINA

AMERICAN BREWMASTER
3021-5 Stony Brook Dr.
Raleigh 27604
(919) 850-0095 (ph)
(984) 251-3030 (txt)
americanbrewmaster.com
Locally owned and operated for 40+ years. Est. 1983.

OHIO

LABEL PEELERS BEER & WINE MAKING SUPPLIES, INC.
636 S. Walnut St.
Ravenna 44266
(330) 678-6400
info@labelpeelers.com
www.labelpeelers.com
Guaranteed lowest shipped price to your door. Hours: Mon–Fri 10 am–7 pm; Sat & Sun 10 am–5 pm.

OREGON

THE HOPPY BREWER
328 North Main Ave.
Gresham 97030
(503) 328-8474
thehoppybrewer@gmail.com
OregonsHoppyPlace.com
Homebrewing Supplies, Draft Equipment, Bottle Shop, Tap Room & Nanobrewery.

THYME GARDEN HERB COMPANY
20546 Alsea Highway
Alsea 97324
(541) 487-8671
Visit us at: www.thymegarden.com
Email: herbs@thymegarden.com
Order NOW for the best selection! Over 22 varieties of certified organic hop rhizomes, extra large and rooted rhizomes. Wholesale by phone or email. Also dried hop cones and herb and pepper seeds.

PENNSYLVANIA

KEYSTONE HOMEBREW SUPPLY
3361 Bethlehem Pike
Souderton 18964
(215) 855-0100
Email: sales@keystonehomebrew.com
www.keystonehomebrew.com
New Location! New Ownership! Your Source for Everything Beer, Wine, Mead, Cider & more! Fresh Wine Grapes & Juice in Spring & Fall. AHA 2025 Homebrew Shop of the Year!

SCOTZIN BROTHERS
65 N. Fifth St.
Lemoyne 17043
(717) 737-0483 or 1-800-791-1464
www.scotzinbros.com
Open Tu-F 10am-6pm,
Sat 10am-5pm
Central PA's Largest IN-STORE Inventory!

VERMONT

BREWFEST BEVERAGE CO.
199 Main St.
Ludlow 05149
(802) 228-4261
www.brewfestbeverage.com
Supplying equipment & ingredients for all your homebrewing needs. Largest selection of craft beer in the area. Growlers poured daily!

VIRGINIA

ORIGINAL GRAVITY
6118 Lakeside Ave.
Richmond 23228
(804) 264-4808
www.oggravity.com
Extensive selection of ingredients, supplies, and equipment for all levels from beginner to seasoned brewer. We have a knowledgeable and friendly staff to assist you with brewing and kegging questions and recipe formulation.

WASHINGTON

JON'S HOMEBREW AND WINE SUPPLY
1430 E. Main Ave., #1430C
Puyallup 98372
(253) 286-7607
jon@jonshomebrew.com
jonshomebrew.com
Puyallup's home for Home Beer and Winemaking supplies!

SOUND HOMEBREW SUPPLY
6505 5th Place S.
Seattle 98108
(855) 407-4156
info@soundhomebrew.com
soundhomebrew.com
Knowledgeable Staff. Great Selection.

WISCONSIN

WINE & HOP SHOP
1919 Monroe Street
Madison 53711
1-800-657-5199 or
(608) 257-0099
www.wineandhop.com
info@wineandhop.com
Madison's locally-owned homebrewing and winemaking headquarters. Offering fresh ingredients, quality supplies, and expert advice for over 40 years.

AUSTRALIA
W. AUSTRALIA

BREWMART BREWING SUPPLIES
*Bayswater * Maddington * Rockingham
Wholesale and Retail suppliers of Brewing Equipment and Ingredients. Find us at brewmart.com.au or on Facebook and Twitter.

NEW ZEALAND

BREWSHOP
www.brewshop.co.nz
sales@brewshop.co.nz
Online homebrew beer supplies

READER SERVICE

ADVERTISERS IN THIS ISSUE, THEIR CONTACT INFO, AND THE AD PAGE NUMBER.

Photo courtesy of Shutterstock.com

BY CHRIS KIRK

HOMEBREWER TO WORLD TRAVELER

Beer for me is not only a passion but a conduit for friendships, experiences, and even love. What started as a hobby turned into a career, led to opportunities to travel the world, and played a large role in shaping who I am. Let me explain.

One thing I learned quickly in the brewing industry was to always stay humble and give everyone the time and attention you'd like to be given. Be genuine and engaging, and it can lead to big opportunities.

Starting out slinging glasses and cleaning floors, I gave myself completely and passionately to the craft of brewing and it started to give back. I was a unique part of a system and suddenly I had value. I found myself holding conversations with titans, being introduced to successful and celebrity brewers, and sharing pints with literal rock stars. So much happened so fast and before I even really knew what was unfolding, I was standing in a brewhouse in the south of Brazil developing recipes with a translator and converting everything to metric and degrees Celsius. The great Cavalcanti brothers of Bodebrown Cervejaria in Curitiba had invited me on an all-expenses-paid brewing tour across the massive expanse of the country. I was privileged to stand on brew decks through the rolling hills of wine country in Bento Gonçalves, the beautiful countryside of Cascavel, enchanting Porto Alegre, the stunning metropolis of São Paulo, the beachside breweries of Rio, and at the mouth of the Amazon River in Belém do Para. By bus, planes, trains, and automobiles we covered every region and brewed beer shoulder to shoulder with the best of Brazil. I fell in love with the country and the people, and after returning several times I even met my wife on a beer train (literally just a train where they serve a lineup of craft beer for a 3-hour trip through the Atlantic Forest).

After my adventures to the southern brewersphere, I again found myself in a far away land doing what I loved. I landed in Stockholm by way of an invite from some of the greatest names in Swedish brewing and beer culture. Through several acquaintances and distribution networks I had come to know a man named Jörgen Hasselqvist, one of the biggest American craft beer importers of Scandinavia, who then introduced me to Patrick Holmqvist, who was at the time the Production Manager at one of Sweden's biggest craft breweries, Nils Oscar. On a trip to the Craft Brewers Conference in Denver, Colorado, Patrick had asked if I would meet him for a beer to discuss the possibility of accepting a summer job at the brewery in Nykoping, about 1.5 hours south of Stockholm by train. I was quick to shake his hand and take the position.

Not long after arriving in the small seaside town, a series of unimaginable events started to unfold and I was working full-time on a brand-new fully automated Kaspar Schulz brewhouse, learning European brewing techniques and immersing myself in a whole new world. The culture shock was surprisingly limited, and I attribute that to beer. Anywhere you go in the world, there is always beer, and that societal brotherhood amongst its creators and admirers. Over the six months I spent in Sweden, dreams came true for me. Nils Oscar was asked to develop signature beers for some of my favorite bands. Not only was I invited to join in the creative process, but I was asked to meet the members and present our beer to them. One of the greatest days of my life was going backstage at the massive Getaway Rock Festival in Gävle and joining the members of Slayer, one of my favorite bands since I was 15, while we pitched our brew and sampled our pilot batch for the Slayer666 Red Ale. And they loved it! BYO

The culture shock was surprisingly limited, and I attribute that to beer. Anywhere you go in the world, there is always beer, and that societal brotherhood amongst its creators and admirers.

Photo courtesy of Chris Kirk

Backstage with Slayer (third from the left) after pitching them a beer I was a part of making for the legendary rock band.

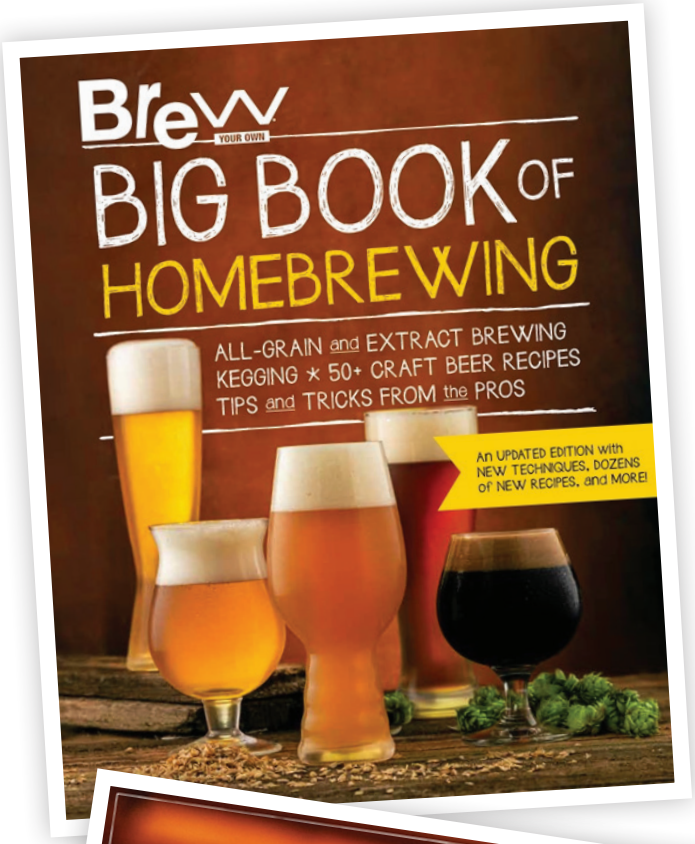
GO BIG WITH Brew YOUR OWN

THE HOW-TO HOMEBREW BEER MAGAZINE

Brew Your Own Big Book of Homebrewing - Updated Edition

The Brew Your Own Big Book of Homebrewing is the ultimate all-in-one homebrew book. It's a first-time homebrewer's best friend, explaining the entire brewing process from start to finish with step-by-step photography. Yet it has plenty for the experienced homebrewer as well, including:

- Fully-illustrated guides for all-grain brewing techniques and home kegging systems
- More than 50 tested recipes, with clones from your favorite beers from popular craft breweries
- A deep dive into brewing ingredients, including malt, hops, yeast, and water adjustments



The Brew Your Own Big Book of Clone Recipes

Enjoy this collection of 300 of our favorite clone recipes, complete with full-color photography. This book contains both the classics and newer recipes from top craft breweries including Brooklyn Brewery, Deschutes, Firestone Walker, Hill Farmstead, Maine Beer Company, Stone Brewing Co., Surly, Three Floyds, Tröegs, and many more. Recipes include all-grain and extract versions.

BYO.COM/BOOK

NEW!

GAMBRINUS IPA MALT

The Heart of Hop-Forward Beer

GAMBRINUS MALTING

RahrBSG

bsghandcraft.com
800.585.5562

AVAILABLE NOW AT YOUR FAVORITE HOMEBREW RETAILER